United States
Department of
Agriculture

Forest Service

Pacific Northwest
Research Station

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**Bureau of Land
Management**

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Evaluation of EIS Alternatives by the Science Integration Team

Volume I

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of the Interior

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Management

Interior Columbia Basin Ecosystem Management Project

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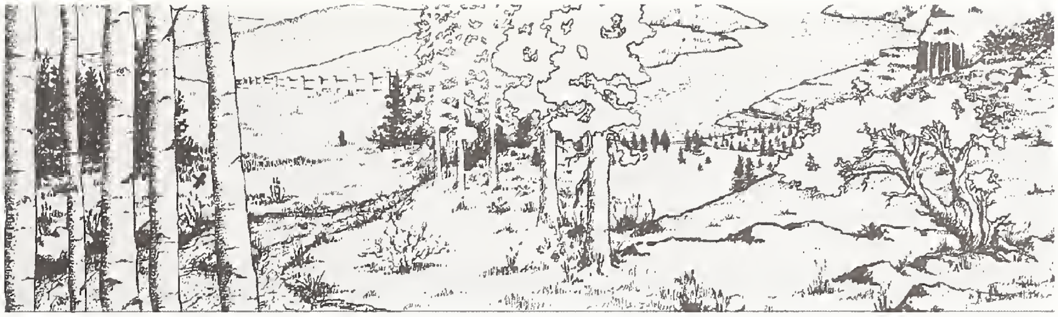

Evaluation of EIS Alternatives by the Science Integration Team Volume I

This volume contains pages 1-536

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Forest Service
Pacific Northwest Research Station
Portland, Oregon

Abstract

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The Evaluation of EIS Alternatives by the Science Integration Team describes the outcomes, interactions, effects, and consequences likely to result from implementing seven different management strategies on Forest Service (FS) and Bureau of Land Management (BLM) administered lands within the Interior Columbia Basin and portions of the Klamath and Great Basins. Two environmental impact statement teams developed seven alternative approaches to the management of forest, rangeland, aquatic, and watershed systems of FS- and BLM- administered lands. The alternatives varied from continuation of current management, to managing biodiversity within a network of large reserves, to actively managing to restore ecosystem health and integrity. Continuing with current management direction, in the absence of interim protection measures, results in continued declining trends in ecological integrity and increasing risk to species. No single alternative was found to result in improved outcomes for all species, reduced risk to ecological integrity, and improved resiliency for social and economic systems. Alternatives that prioritize activities to restore and/or maintain ecological integrity and simultaneously provide desired goods and services within the capability of the ecosystem appear to have favorable trends in most species outcomes, landscape functions, and resiliency in social and economic systems. The Draft and Final Environmental Impact Statements are expected to differ to some extent from the preliminary Draft Environmental Impact Statement analyzed for this evaluation.

Keywords: Ecosystem management; ecological integrity; socioeconomic resiliency; management and goals; risk management

Preface

This document is one of three primary products from the Science Integration Team (SIT) of the Interior Columbia Basin Ecosystem Management Project (ICBEMP). The first is a *Framework for Ecosystem Management* (Haynes and others 1996); the second is the compilation of detailed reports from each science team staff, referred to as the *Assessment of Ecosystem Components* (Quigley and Arbelbide, in press). In addition to the products from the SIT, the Upper Columbia River Basin Environmental Impact Statement and the Eastside Environmental Impact Statement comprise the other primary products of the ICBEMP. Jointly they represent the information gathered for the purpose of adopting a scientifically sound, ecosystem-based management strategy for Forest Service and Bureau of Land Management lands within the interior Columbia River Basin and portions of the Klamath and Great Basins.

The Environmental Impact Statements (EISs) were developed under the leadership of Jeff Blackwood, Steve Mealey, Pat Geehan, Linda Colville, Jim May, Jeff Walter, Cathy Humphrey and George Pozzuto. A complete listing of all EIS team members would include several dozen individuals. Critical to the content of the alternatives was the involvement of the Executive Steering Committee and other Regional Executives including: Elaine Zielinski, Martha Hahn, Larry Hamilton, Robert Williams, Hal Salwasser, Dale Bosworth, Thomas Mills, Denver Burns, William Stelle, Michael Spear and Chuck Clarke.

All members of the Science Integration Team participated in discussions and contributed to analysis or writing early versions of this report. This document has evolved from a rough draft in late 1995. Charles Philpot and Thomas Mills have been particularly influential in helping define and protect the role of science within this science and management partnership. Integral to this work was the development of concepts related to and estimates of integrity, resiliency, and risk. James Sedell, Danny Lee, Paul Hessburg, Bruce Rieman, Mark Jensen, Brad Smith, Jeff Jones, and Wendel Hann developed the ecological integrity elements and the forest and range clusters. The material related to composite ecological integrity was developed by James Sedell, Danny Lee, Richard Holthausen, Bruce Marcot, Wendel Hann, Jeff Jones, and Thomas Quigley. Richard Haynes, Amy Horne, and Jim Burchfield developed measures of socioeconomic resiliency. Richard Haynes, Wendel Hann and Thomas Quigley developed the risk ratings for ecological integrity and risk to human assets from wildlands.

The chapters include individual acknowledgments of contributions to the completion of this document. Literally hundreds of individuals have made specific contributions. We are certain to have failed in recognizing everyone's contribution. We apologize for any oversights.

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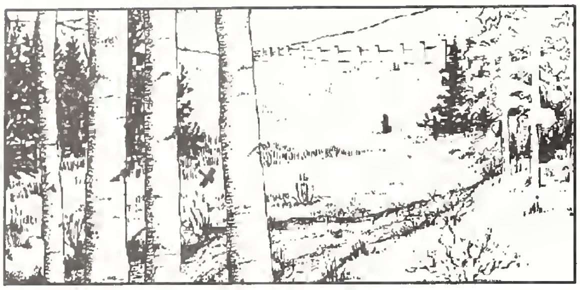

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CHAPTER 1

Introduction

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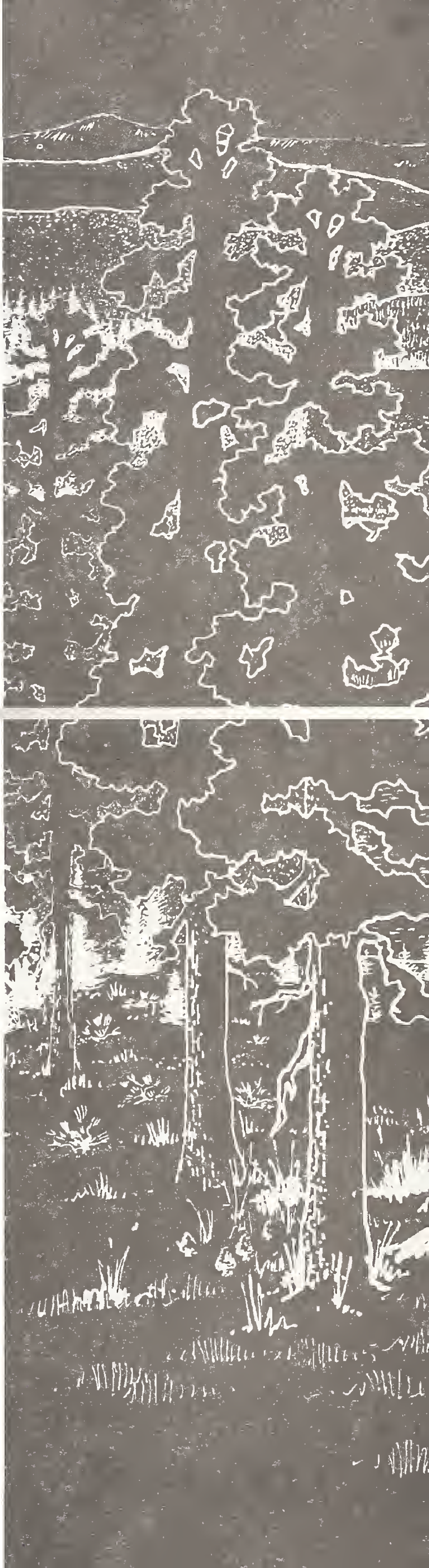

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INTRODUCTION

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Introduction

In July 1993, as part of his plan for ecosystem management in the Pacific Northwest, President Clinton directed the Forest Service (FS) to "develop a scientifically sound and ecosystem-based strategy for management of Eastside forests." To accomplish this, in January 1994, the Chief of the Forest Service and the Director of the Bureau of Land Management jointly established the Interior Columbia Basin Ecosystem Management Project (ICBEMP). The area covered by the ICBEMP includes lands within the interior Columbia Basin east of the Cascade crest and those portions of the Klamath and Great Basins within Oregon (the Basin) (map 1.1). This area includes over 58.4 million hectares (144.6 million ac), 30.9 million hectares (76.3 million ac) of which are lands administered by the U.S. Department of Agriculture, Forest Service and the U.S. Department of Interior, Bureau of Land Management (BLM).

Three teams were established to accomplish the project's objectives, a Science Integration Team (SIT) and two Environmental Impact Statement (EIS) Teams. The EIS teams were established to prepare Environmental Impact Statements, one covering the Upper Columbia River basin (UCRB), those portions of the interior Columbia River basin in Idaho, Montana, Wyoming, Nevada, and Utah, and one covering Oregon and Washington east of the crest of the Cascade Range (Eastside). These areas are displayed in maps 1.2 and 1.3. Tables 1.1 and 1.2 show the amount of agency-administered land in each area.[1] Drawing on information developed for the assessment, the EISs were to examine management options for FS- and BLM-administered lands in the Basin.

Both EISs were developed with a common set of alternatives. Decisions resulting from the EISs will not completely replace existing land and resource management plans but place the focus on those broad-scale issues that have been challenging to address on a unit-by-unit basis. Many conditions and decisions, most appropriately addressed at the local level, are not addressed in the EISs.

The Science Integration Team was charged with developing a scientific framework for ecosystem management and conducting a scientific assessment of the Basin and an evaluation of EIS alternatives. The document, *A Framework for Ecosystem Management in the Interior Columbia Basin and Portions of the Klamath and Great Basins* (Framework) (Haynes and others 1996), describes the principles, and planning and analysis processes, applicable for managing ecosystems in the Basin at multiple geographic extents and resolutions of data. *An Assessment of Ecosystem Components in the Interior Columbia Basin* (Component Assessment) (Quigley and Arbelbide, in press), and other documents including *An Integrated Scientific Assessment of the Interior Columbia Basin* (Integrated Assessment) (Quigley and others 1996), summarize the assessment process and examine the historical trends, current status and trends, and projections about the future outcomes and conditions of ecosystems within the Basin. This document, the *Evaluation of EIS Alternatives by the Science Integration Team,* looks at the alternatives developed by the EIS teams in light of the scientific information brought forward in the assessment process. Figure 1.1 provides a flow diagram for the relationship of the science assessment and the evaluation of the alternatives to the EISs.

An attempt was made to evaluate a version of the EIS alternatives in October, 1995. The evaluation was not totally possible, however, due to the rough and changing nature of the alternatives, their internal inconsistencies, a lack of specificity and spatial definition, and the consequent inability to project viability outcomes for terrestrial and aquatic species.

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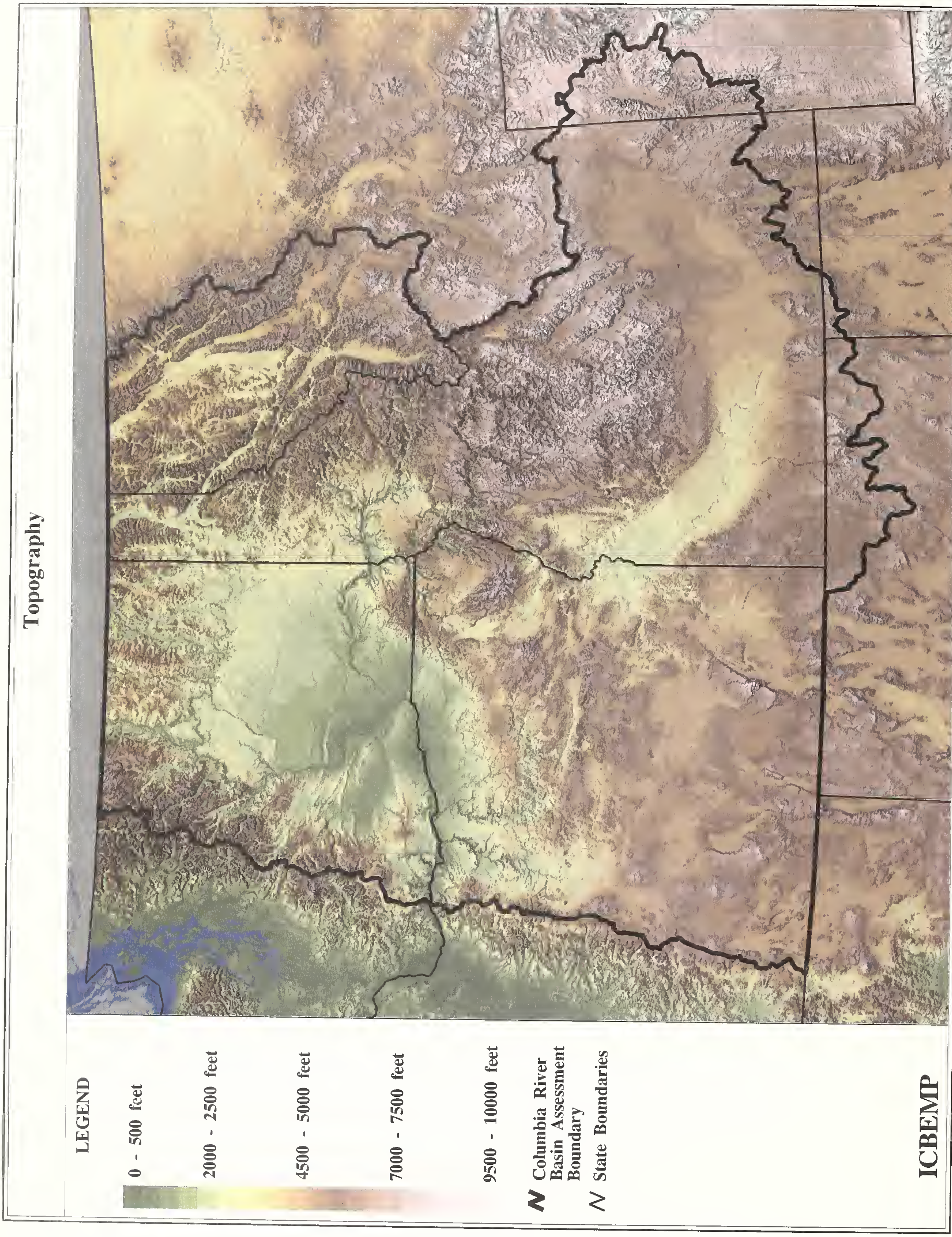
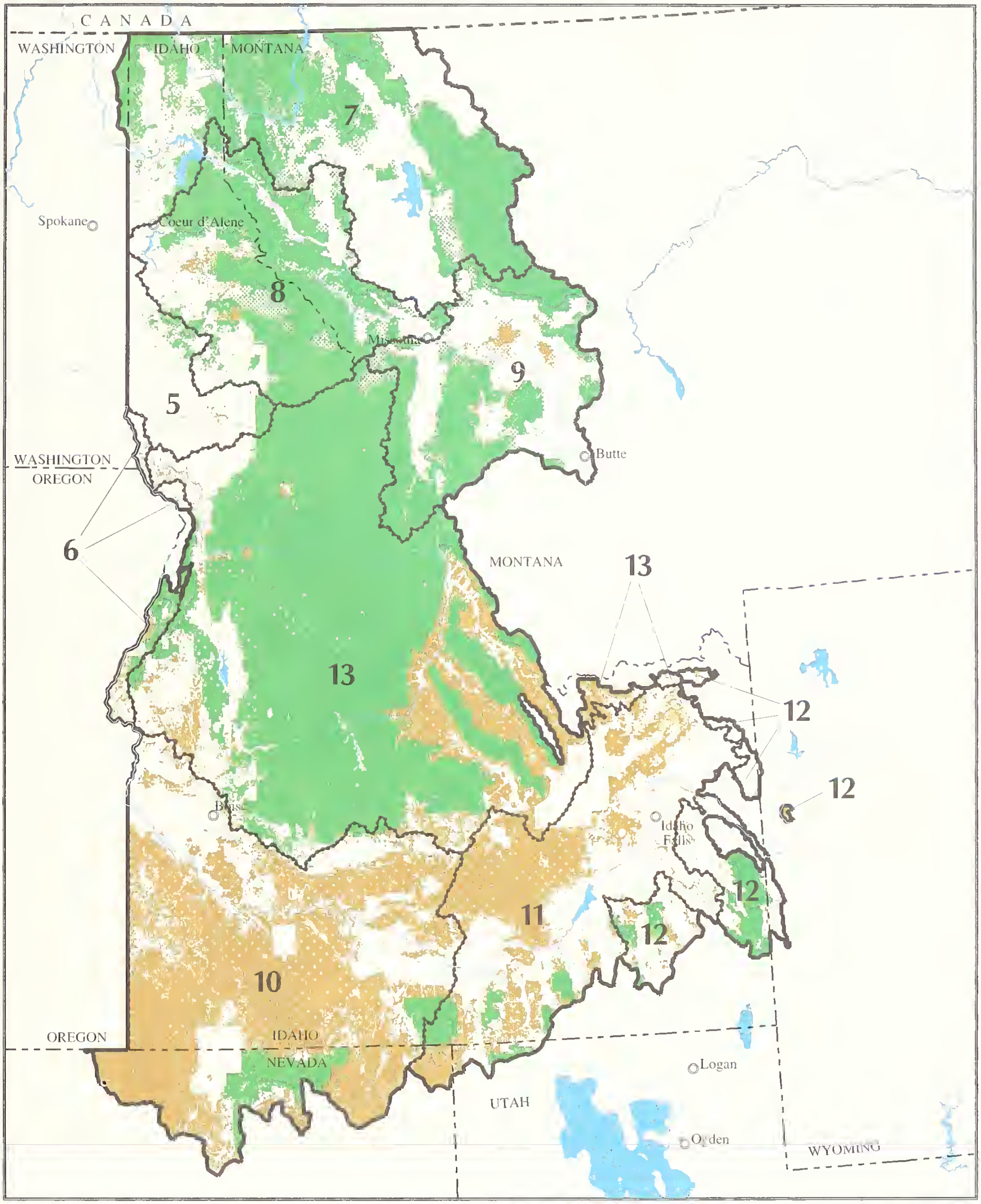
[1]The Targhee and Bridger-Teton National Forests and portions of the Caribou National Forest that lie within the boundaries of both the UCRB and Greater Yellowstone Ecosystem will be excluded from the analysis of effects in the EIS and from decisions made in the Record(s) of Decision (ROD). All BLM lands within the boundaries of the UCRB, whether or not they overlap with boundaries of the Greater Yellowstone Ecosystem, will be covered by the ROD(s).



Map 1.1 – Topography of the Interior Columbia Basin Ecosystem Management Project assessment area. The assessment area consists of the planning areas for both the Eastside and UCRB Environmental Impact Statements.



Map 1.2 – BLM- and FS-administered lands in the Upper Columbia River Basin EIS area.

50 0 50 100 km

N

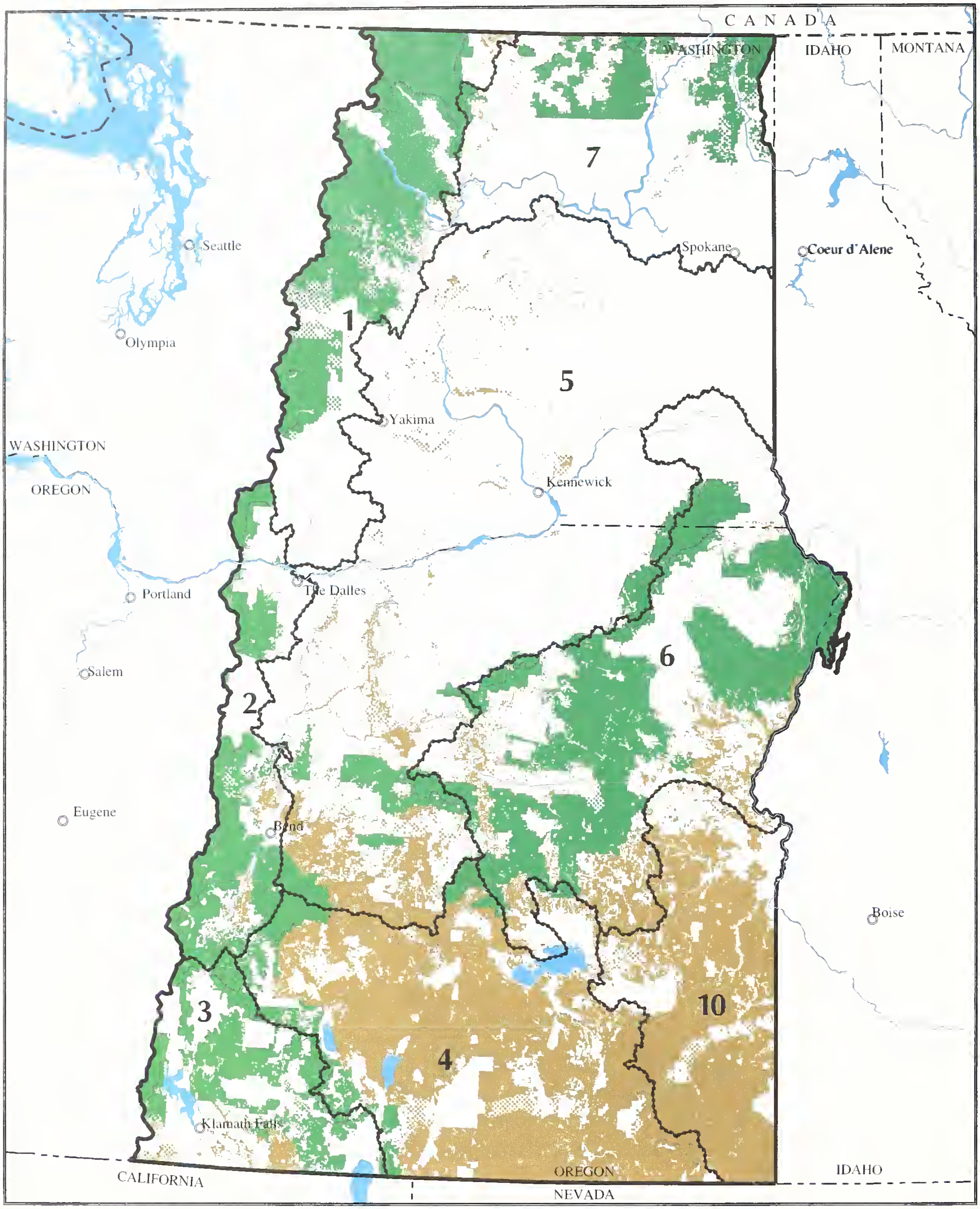
BLM & Forest Service Administered Lands

INTERIOR COLUMBIA
BASIN ECOSYSTEM
MANAGEMENT PROJECT

Draft UCRB EIS
1996

Forest Service Administered Lands
BLM Administered Lands
Water
EIS Area Border
Ecological Reporting Unit Border:

5 Columbia Plateau
6 Blue Mountains
7 Northern Glaciated Mountains
8 Lower Clark Fork
9 Upper Clark Fork
10 Owyhee Uplands
11 Upper Snake
12 Snake Headwaters
13 Central Idaho Mountains



Map 1.3 – BLM- and FS-administered lands in the Eastside EIS area.

50 0 50 100 km

BLM & Forest Service Administered Lands

INTERIOR COLUMBIA BASIN ECOSYSTEM MANAGEMENT PROJECT

Draft EASTSIDE EIS
1996

Forest Service Administered Lands
BLM Administered Lands
Water
EIS Area Border
Ecological Reporting Unit Border:
1 Northern Cascades
2 Southern Cascades
3 Upper Klamath
4 Northern Great Basin
5 Columbia Plateau
6 Blue Mountains
7 Northern Glaciated Mountains
10 Owyhee Uplands
Cities and Towns

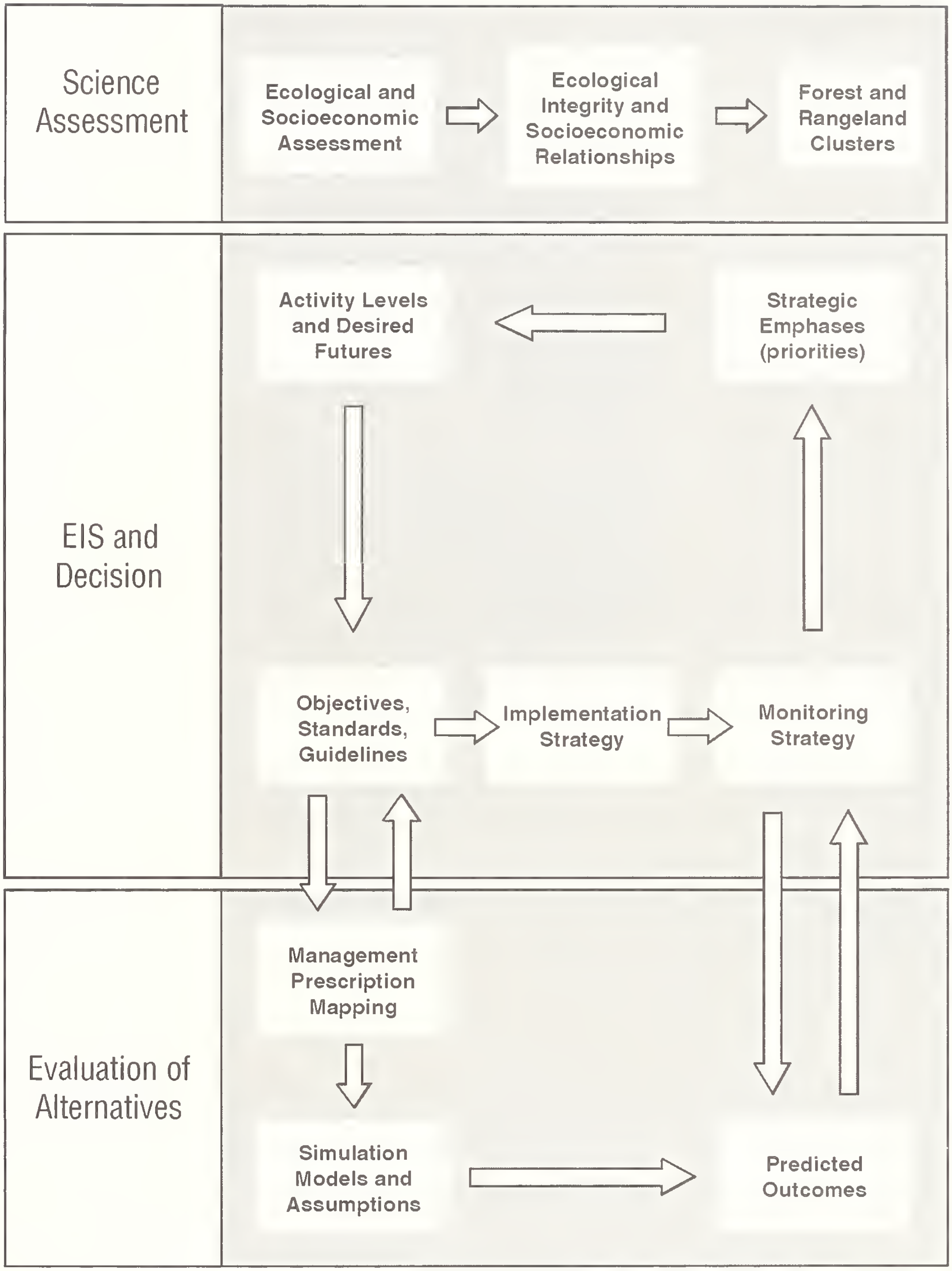


Figure 1.1 – Relationship of the Evaluation of Alternatives to the Scientific Assessment and Environmental Impact Statements.

Table 1.1 — National Forest and BLM Districts affected by the Eastside EIS.

State	National Forest or BLM District	Acres Affected[1]
Oregon	Burns BLM District	3,417,000
	Columbia River Gorge National Scenic Area (FS)	6,000
	Crooked River National Grassland	117,000
	Deschutes National Forest[2]	1,584,500
	Fremont National Forest	1,140,000
	Lakeview BLM District	3,382,000
	Malheur National Forest	1,459,500
	Medford BLM District	500
	Mount Hood National Forest	330,500
	Ochoco National Forest	847,000
	Prineville BLM District	1,648,000
	Umatilla National Forest	1,068,500
	Vale BLM District	5,043,000
	Wallowa-Whitman National Forest[3]	2,249,000
	Winema National Forest	1,037,500
	Oregon Total	**23,330,000**
Washington	Columbia River Gorge National Scenic Area (FS)	8,000
	Colville National Forest	1,088,000
	Gifford Pinchot National Forest	187,500
	Okanogan National Forest	1,497,500
	Spokane BLM District	347,000
	Umatilla National Forest	311,000
	Vale BLM District	10,500
	Wenatchee National Forest	2,192,000
	Washington Total	**5,641,500**
Idaho	Nez Perce National Forest	4,500
	Payette National Forest	4,000
	Wallowa-Whitman National Forest	131,000
	Idaho Total	**139,500**
Eastside EIS Total		**29,111,000**

[1]Acres listed are only those administered by the Bureau of Land Management or the Forest Service.

[2]Newberry Crater National Volcanic Monument acres included.

[3]Hells Canyon National Recreation acres included.

Source: ICBEMP GIS data (converted to a 100 x 100 meter grid and rounded to nearest 500 acres). These totals will not match official government land office totals or those shown elsewhere in this document that were calculated from a 1000 x 1000 meter grid (1 km^2).

This table was adapted from the Eastside Preliminary Draft EIS.

Table 1.2 — National Forests and BLM Districts addressed by the Upper Columbia River Basin EIS.

State	National Forest or BLM District	Acres Affected[1]
Idaho	Bitterroot National Forest	470,500
	Boise National Forest	2,573,500
	Caribou National Forest[2]	580,000
	Challis National Forest	2,463,000
	Clearwater National Forest	1,814,500
	Curlew National Forest	4,000
	Idaho Panhandle National Forest[3]	2,456,000
	Kootenai National Forest	45,000
	Nez Perce National Forest[4]	2,111,500
	Payette National Forest[4]	2,354,000
	Salmon National Forest	1,687,500
	Sawtooth National Forest	1,691,000
	Lower Snake River BLM District	5,169,000
	Upper Snake River BLM District	5,017,000
	Upper Columbia-Salmon Clearwater BLM Districts	1,550,500
	Idaho Total	**29,987,000**
Montana	Bitterroot National Forest	1,115,000
	Deerlodge National Forest	695,000
	Flathead National Forest	2,369,500
	Helena National Forest	385,000
	Idaho Panhandle National Forests	27,500
	Kootenai National Forest	2,207,000
	Lolo National Forest	2,075,000
	Butte BLM District	150,000
	Montana Total	**9,024,000**
Nevada	Humboldt National Forest	632,000
	Elko and Winnemucca BLM Districts	1,953,000
	Lower Snake River BLM District	49,500
	Nevada Total	**2,634,500**
Utah	Sawtooth National Forest	59,000
	Salt Lake BLM District	52,500
	Utah Total	**111,500**
Wyoming	Caribou National Forest	7,000
	Rock Springs BLM District	23,000
	Wyoming Total	**30,000**
UCRB EIS Total		**41,787,000**

[1]Acres listed are only those administered by the Bureau of Land Management or the Forest Service.

[2]Excludes portion within the Greater Yellowstone Ecosystem.

[3]Includes 119,000 acres in Washington.

[4]Includes portion assigned to Eastside EIS.

Source: ICBEMP GIS data (converted to 100 x 100 meter grid and rounded to nearest 500 acres). These totals will not match official government land office totals or those shown elsewhere in this document that were calculated from a 1000 x 1000 meter grid (1 km^2).

Adapted from the Upper Columbia River Basin Preliminary Draft EIS.

While the SIT was attempting to evaluate the October 1995 version of the alternatives, it was also completing a classification of river subbasins (4th-field hydrologic units) for assessment of integrated forest, range, and aquatic integrity (Quigley and others 1996). This information contributed to the development of forest and range clusters, or groups of subbasins with similar broad biophysical environments, ecological integrity, amounts of wilderness-like allocations, amounts of roads, and risks to ecological integrity. The clusters provided the spatial resolution needed to develop a more specific set of alternatives and a more comprehensive analysis of effects. The clusters became the basic unit for management emphasis and the logic behind the prioritization and allocation of management activities described in the alternatives. Revised alternatives were developed based on the new approach.

The version of the EIS alternatives under evaluation here was presented to the SIT on February 26, 1996 in a package titled "Alternatives Package for SIT Evaluation for Eastside and UCRB EISs," containing seven alternatives. Referred to as the February 1996 Preliminary Draft EIS in this document, it is on file as part of the project record.[2] Pertinent information from this document relating to the evaluation is also included, for reference, in appendix I. (Appendix I is located at the back of Volume II this document.)

During this SIT evaluation process a number of additional questions arose about the specifics of the alternatives. An interactive process between the SIT and EIS teams resulted in substantial clarification. Where there was insufficient detail in the alternatives to conclude an evaluation, the SIT made assumptions in order to provide clarification and allow the evaluation to proceed. Those assumptions were screened to eliminate internal conflict and immediately passed on to the EIS teams. The assumptions used for the evaluation by each SIT staff area are described in the individual staff area chapters which follow.

Because of the lack of specificity necessary for evaluation of the earlier draft, as well as the development of the cluster approach and the staff area assumptions, the EIS teams adopted an iterative approach to refining the objectives, standards, guidelines, and other strategies described in the EIS alternatives. The concurrent nature of the EIS development and scientific assessment resulted in additional information becoming available during the evaluation of the February 1996 Preliminary Draft EIS alternatives. The EIS Teams used the SIT information as a basis to further refine alternatives in later drafts.

Description of Alternatives

Alternative development begins with a statement of purpose and need for the proposed action. For the Upper Columbia River Basin (UCRB) and Eastside (EEIS) EISs, the purpose is to provide a coordinated approach to a scientifically sound, ecosystem-based management strategy for lands

The purpose of the proposed action — to provide a scientifically sound, ecosystem-based management strategy: 1) restore and maintain long-term ecosystem health and integrity; 2) support economic and/or social needs of people, cultures and communities, and provide predictable levels of products and services; 3) update current land management plans based on ecosystem management principles; 4) provide consistent direction at a landscape level; 5) restore and maintain habitat needs of plant and animal species; 6) provide opportunities for cultural, recreational and aesthetic experiences; 7) provide long-term management direction to replace interim strategies; and 8) identify barriers to implementing the strategy or achieving desired conditions.

The need for the proposed action — 1) restore and maintain long-term ecosystem health and integrity, and 2) support economic and/or social needs of people, cultures and communities, and provide predictable levels of products and services.

[2]On file with: U.S. Department of Agriculture, Forest Service; U.S. Department of Interior, Bureau of Land Management, Interior Columbia Basin Ecosystem Management Project, 112 E. Poplar, Walla Walla, Washington, 99362.

administered by the Forest Service (FS) or Bureau of Land Management (BLM) in the Basin. The stated need for this action is to restore and maintain long-term ecosystem health and integrity, to support the economic and/or social needs of people, cultures, and communities, and to provide predictable levels of goods and services from National Forest System and Bureau of Land Management lands.

Currently, there are 74 existing land and resource management plans administered by the BLM or FS within the Basin. Because these plans were not developed and approved at the same time, or in concert with one another, they do not necessarily reflect consistent approaches in land management. There are several important conceptual differences between the current plans and the alternatives developed by the EIS teams.

Alternatives represent potentially different approaches to meet the purpose and need for action. Broad goals are defined that remain consistent across the alternatives and outline a common set of outcomes sought from FS- and BLM-administered lands within the Basin. Each alternative has a broad theme that describes the basic strategy underlying the alternative. A desired range of future conditions describes primary vegetation futures for major vegetation categories. Management emphasis, activity levels, objectives, standards and guidelines are provided for specific areas in an effort to achieve the goals and desired future conditions. To fully understand any given alternative and its effects requires integrating all these pieces, as well as interpreting how implementation and monitoring will occur (see figure 1.1).

Alternative 1 is the "no action" alternative which would continue management strategies under existing approved plans with the addition of direction from the Northwest Forest Plan. Current direction, which includes existing plans plus PACFISH, INFISH, and Eastside Screens is reflected in Alternative 2. The direction described in Alternative 1 applies to those areas not covered by such interim direction. The EIS teams designed Alternatives 3 through 7 to meet the purpose and need statement in the EISs. Each of these alternatives examines different ways of responding to the issue questions identified through the public scoping process. Alternatives 1 and 2 were not designed fully to satisfy the purpose and need but to provide the benchmarks required by the National Environmental Policy Act (NEPA)[3] against which to evaluate the "action" alternatives.

There are several differences between existing plans and the alternatives developed by the EIS teams. Existing plans were designed primarily on the assumption that healthy ecosystem conditions existed. Alternatives 3 through 7 recognize that the FS and BLM administer some systems that, for a variety of reasons, no longer exhibit healthy, functioning conditions. Past timber and livestock management, past roading practices, and exclusion of fire are examples of activities that have altered systems. Some of this is desired by society; some creates long-term challenges. Other events, such as climate cycles, exotic weed expansion, and the way in which other lands are managed, influence how FS and BLM lands are administered. The reverse is also true. These conditions are more fully considered in Alternatives 3 through 7 than they are under existing plans.

Alternatives 3 through 7 attempt to portray consistent interagency approaches to broad-ranging issues, such as the decline in cold water fish and riparian habitat, concerns about late-seral forest, and the expansion of exotic weed species, as well as to incorporate the use of ecosystem management principles as they evolve. These alternatives also incorporate more meaningful participation at all levels, and recognize the unique needs and contributions of tribes and local governments.

Existing forest plans are heavily based on even-aged forest management. These plans emphasize commodity production and mitigate for other

[3]National Environmental Policy Act of 1969. 42 U.S.C. 4321(note).

resource values. Alternatives 3 through 7 rely less on even-aged forest management and focus on reversing the decline in large trees and late-seral forest structure. Timber harvest volume from existing plans comes from all size classes; most volume from Alternatives 3 through 7 comes from smaller size and age classes from either thinnings or removal of smaller trees to enhance development of residual overstory trees. In addition, these alternatives rely more heavily on the use of prescribed fire to restore patterns and structures that are consistent with those in which these elements evolved.

Under existing plans and current direction, there is no overall cold water fish and riparian management strategy. Parts of the planning area are covered by direction in existing plans; some parts are covered by direction in the Northwest Forest Plan, PACFISH, INFISH, or Eastside Screens. This has been confusing, and makes consistent approaches to management, inventory, monitoring, and adaptive management difficult. Alternatives 3 through 7 describe common and consistent approaches to managing aquatic and riparian resources on lands administered by the BLM or FS. In addition, the primary management goals and objectives for activities in these areas would be to maintain or improve aquatic/riparian functions and processes. Strategies in these alternatives also address the links between riparian areas and uplands, relating these to overall watershed function.

Vegetation management emphasis on forest lands would be different from existing plans and current direction in the "action" alternatives. Whether considering salvage or working with healthy forests, these alternatives emphasize appropriate ecosystem analysis in order to determine desirable patterns, structure, and composition of vegetation that consider natural disturbance events and regimes closely. They emphasize those patterns, structures, and compositions that are, consistent with the theme of the alternative, desirable to carry into the future. Resources in excess of these needs are available for social and economic benefits to society. A similar approach for vegetation management on rangelands is also described.

A description of each EIS alternative as it was presented to the SIT in the February 1996 UCRB and Eastside Preliminary Draft EISs follows.

Alternative 1 (No Action) — Alternative 1 continues management specified under existing FS and BLM plans. Implementation of this alternative would occur assuming recent budgets. An analysis of the alternative is a requirement of NEPA, as well as of BLM and FS planning procedures. This alternative displays the federal agencies' use of existing plans to manage lands and resources into the future. Existing FS and BLM plans include Regional Guides, Forest Plans (for each National Forest), and Resource Management Plans and Management Framework Plans (for BLM Resource Areas). The No Action Alternative includes direction from current land-use plans of 35 National Forests and 17 BLM Districts.

Although substantial variation exists among agency plans, the general management approach is to emphasize or accommodate sustained timber, wood fiber, and livestock forage production in an environmentally prudent manner while managing and protecting other resources and values. Timber and livestock management are integrated and coordinated with the maintenance or enhancement of wildlife and fish habitat, scenic quality, recreation opportunities, and other resource values to achieve overall multiple-use goals and objectives. Management for other resources or values, such as recreation, wilderness, big game and fish habitat, or cultural resources is emphasized in many areas. The existing plans were developed with little or no attempt to coordinate management with other FS or BLM administrative units. There also was no attempt to describe cumulative effects of actions taken over areas larger than the local unit.

Alternative 2 — This alternative applies recent interim direction as the long-term strategy for lands administered by the FS or BLM. The interim direction was developed to retain options for management of affected Federal lands while the EISs were being developed. Specific direction is described in the following Decision Notices:

- Implementation of Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH), February 24, 1995; Eastside: Applies to all or parts of Malheur, Ochoco, Okanogan, Umatilla, and Wallowa-Whitman National Forests and Prineville, Spokane and Vale BLM Districts. UCRB: Applies to all or parts of Bitterroot, Boise, Challis, Clearwater, Nez Perce, Payette, Salmon, and Sawtooth National Forests and Coeur d'Alene and Salmon BLM Districts.

- Continuation of Interim Management Direction Establishing Riparian, Ecosystem and Wildlife Standards for Timber Sales (Eastside Screens), May 20, 1994, and amended June 5, 1995. Riparian standards were replaced by the riparian management objectives included in the decision for Inland Native Fish Strategy signed July 28, 1995, for those forests not already covered by PACFISH riparian standards (see section above); Applies to all or parts of Colville, Deschutes, Fremont, Malheur, Ochoco, Okanogan, Umatilla, Wallowa-Whitman and Winema National Forests.

- Inland Native Fish Strategy, July 28, 1995. Eastside: Applies to all or parts of Colville, Deschutes, Fremont, Malheur, Ochoco, Okanogan, Wallowa-Whitman and Winema National Forests. UCRB: Applies to all or parts of Bitterroot, Deerlodge, Flathead, Helena, Kootenai, Lolo, Boise, Caribou, Challis, Clearwater, Idaho Panhandle, Payette, Sawtooth, and Humboldt National Forests.

The interim direction emphasizes protection and maintenance of aquatic riparian and wildlife resources while using conservative approaches to management. All other direction from current plans would also continue into the future; the direction described in Alternative 1 applies to those areas not covered by interim direction.

Alternative 3 — This alternative updates existing FS and BLM plans to be consistent with the principles of ecosystem management. Changes in management are prioritized to respond to changing conditions (such as declining forest and rangeland health, local economies at risk, and declining salmon runs), minimize changes to local plans; and rely on local public needs and desires. Each National Forest or BLM unit would emphasize local public input to determine a desired mix of uses, services, restoration and management actions consistent with ecosystem principles which would be incorporated into the land-use plans. Direct involvement with state, county, and tribal governments would be used in planning, decision-making, and implementation of programs.

The alternative emphasizes making only minimal repairs to existing plans that would allow them to be more effective, integrated, and consistent in the face of changed ecological conditions and increasing numbers of appeals and lawsuits. Only those priority conditions that most hinder the effectiveness of existing plans are addressed in this alternative and distinguish it from Alternative 1. The intent of this alternative is to provide a broader dimension for and more integrated management direction about priority large-scale issues that cross administrative boundaries than Alternatives 1 or 2.

Alternative 4 — This alternative is designed to aggressively restore ecosystem health based on the principles of ecosystem management. This would occur through active management, the results of which would resemble endemic disturbance processes such as insects, disease, and fire. The alternative focuses on short-term vegetation management that would improve the likelihood of moving toward or maintaining ecosystem processes that function properly in the long term. Under this alternative, vegetation management is designed to reduce risks to property, products, and economic and social opportunities that can result from large epidemic disturbance events. Direct involvement with state, county, and tribal governments would be used in planning, decision-making, and implementation of programs.

Priority in this alternative is placed on forest, rangeland, and watershed health, assuming that

healthy streams, wildlife populations, and economic and social benefits would follow. Actions taken to achieve desired conditions are designed to produce economic benefits whenever practical. A wide variety of management tools are available under this alternative.

Alternative 5 — This alternative emphasizes production of goods and services, consistent with the principles of ecosystem management, at the sub-regional level. Biological capability and economic efficiency are used to determine relative priority uses for an area, rather than local demands and traditional uses. Areas that are best able to produce products, goods or services, or desired conditions are targeted to do so within the ecological capability of the area. Other uses are expected to exist when they do not conflict with or diminish the priority uses. While a full range of conditions, products, and services may not be provided in all localities, the desired range of conditions, products, and services would be met on a regional basis. Direct involvement with State, county, and tribal governments would be used in planning, decision-making, and implementation of programs.

Under this alternative, both EIS teams (UCRB and Eastside) identified areas across the project area best able to produce products, goods, services, or desired conditions, within the ecological capability of the land. Five major Basin-wide emphasis areas were considered: timber, livestock, aquatic resources, wildlife, and recreation. The assumption used in building this alternative was that each emphasis area has only one priority emphasis. Other uses are likely to occur, but any conflicts would be resolved in favor of the priority use of the emphasis area. These areas are shown on maps 1.4 and 1.5.

Alternative 6 — This alternative emphasizes an adaptive management approach to restoration and maintenance of ecosystems and provision for the social and economic needs of people based on the principles of ecosystem management. While much knowledge of natural resource management has been acquired through experience and research, ecosystems are complex and knowledge about the functions and processes that make up ecosystems is limited. Management strategies would be adjusted based on information gained from continued research and monitoring of ecological, social, and economic conditions and from direct input from State, county, and tribal officials.

This alternative is similar to Alternative 4 but takes a slower, more cautious approach and implies the use of experimental processes, local research, and extensive monitoring. Under this alternative, actions would be implemented on a broad-scale basis only when previous monitoring results or scientific research demonstrates that the actions are effective in achieving desired outcomes. Priorities for restoration would generally be high hazard or high risk areas that have a high or moderate potential for successful restoration. The management direction under this alternative is similar to that under Alternative 4 except for the length of time expected to reach desired conditions and the built-in uncertainty about which management actions would prove to be the most effective.

Alternative 7 — This alternative emphasizes reducing risk to ecological integrity and species viability by establishing a system of reserves with interconnecting corridors on lands administered by the BLM or FS. Reserves would be located to include all representative vegetation types and are intended to be large enough to contain the most likely disturbance events (proposed reserve areas are shown on map 1.6). The level of human use and management would be low within the reserves. Ecological disturbance events are expected and would occur naturally within the reserves. When disturbance events (such as fire or disease) occur, actions would be taken to reduce the likelihood of the event extending beyond the boundary of the reserve. Most restoration activities would occur on lands administered by the FS or BLM outside reserves. Restoration could occur within reserves, however, where there is a high risk for events occurring in the short term that would preclude achieving desired outcomes in the long term (for example, to maintain habitats for endangered

or threatened species or other scarce habitats, or control erosion by rehabilitating roads). Management outside the reserve boundaries includes an emphasis on conserving remaining old forest stands and roadless areas larger than 1,000 acres. Direct involvement with State, county, and tribal governments would be used in planning, decision-making, and implementation of programs.

Reserves would be selected for their representation of vegetation and rare animal species. Although some reserves might be designed around the needs of single species, the intent would be for reserves to conserve biodiversity across the landscape and meet the needs of groups of species or communities. No commercial timber harvest is permitted inside reserves, but limited silvicultural activities that could enhance species viability would be allowed. To improve the long-term conditions for which the reserve was established, grazing would be strictly limited. Dispersed, low-impact recreation use would be allowed as long as it did not affect populations of rare species or their habitat. Management of reserves would focus on long-term maintenance of native processes and conditions with which plant and animal species have evolved. Areas adjacent to reserves (buffers) would be managed to help maintain reserves by avoiding barriers or breaks in the vegetation that would isolate them. Management would be allowed in buffers, but road densities would usually be low. Reserves would be interconnected where possible by vegetative corridors to allow interchange of animals. Management would be allowed within corridors, but habitat conditions that allow for the dispersal of animals would be important considerations when designing management activities.

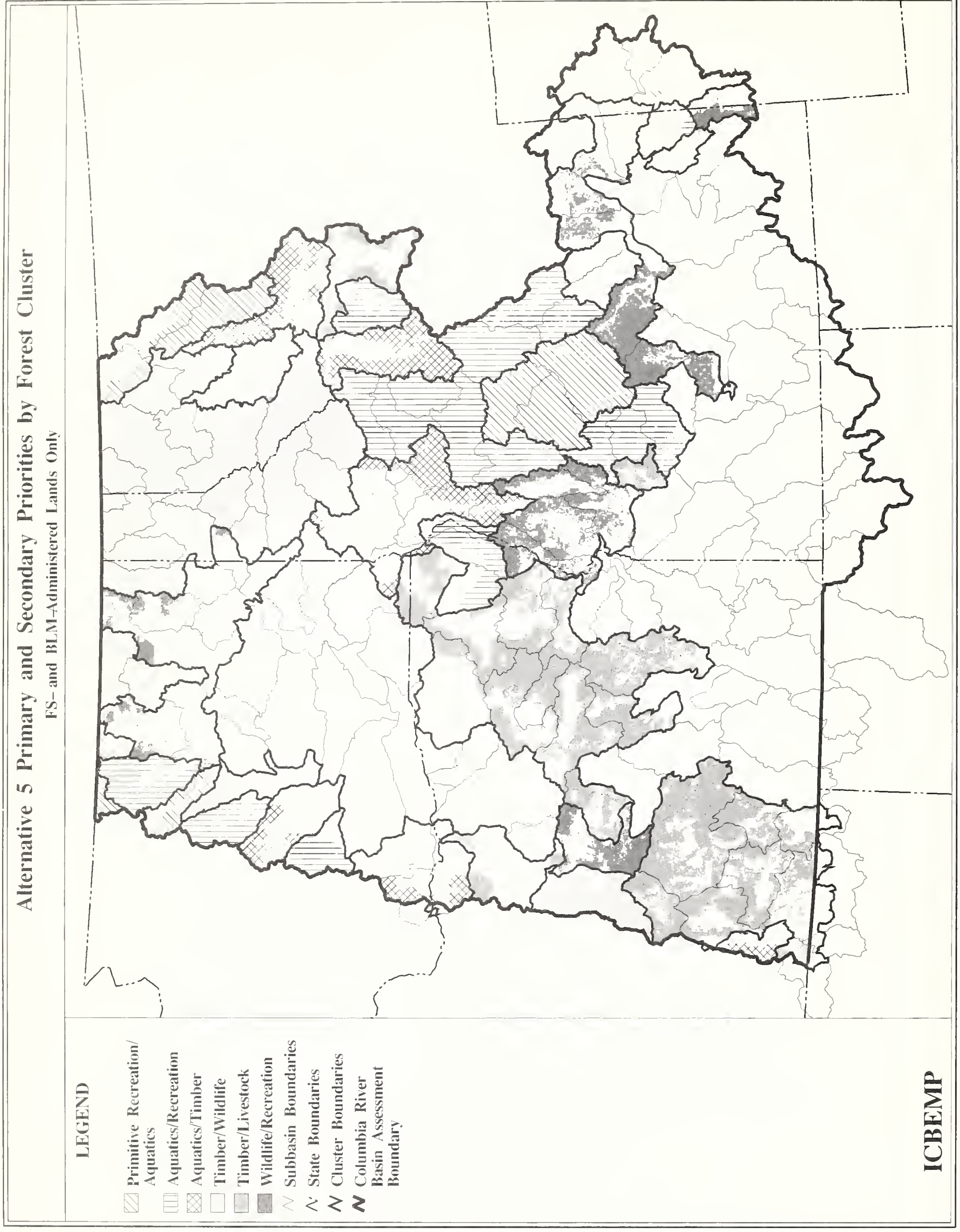
Interpreting Rule Sets and Management Emphasis Categories

The SIT integrated its assessment and organized subbasins within clusters based on common ecological themes that highlight the similarities of subbasins, grouped within clusters, while acknowledging substantive differences among the subbasins (Quigley and others, 1996, pages 105-123). Six forest and six rangeland clusters emerged representing a synthesis of common management history, resultant conditions, management needs, opportunities, and potential conflicts across the landscape. The EIS teams then developed rule sets to describe the level of various management activities or a general management emphasis that would be applied to the various clusters under each alternative. (Pertinent excerpts from these rule sets are included in appendix I.) These management emphases are: Conserve (C), Restore (R), or Produce (P). Recognizing that management emphasis has more variability than can be reflected by these three categories alone, the categories were refined by adding combinations of emphasis as follows: Restore-Conserve (R-C), Restore-Produce (R-P), and Produce-Conserve (P-C).

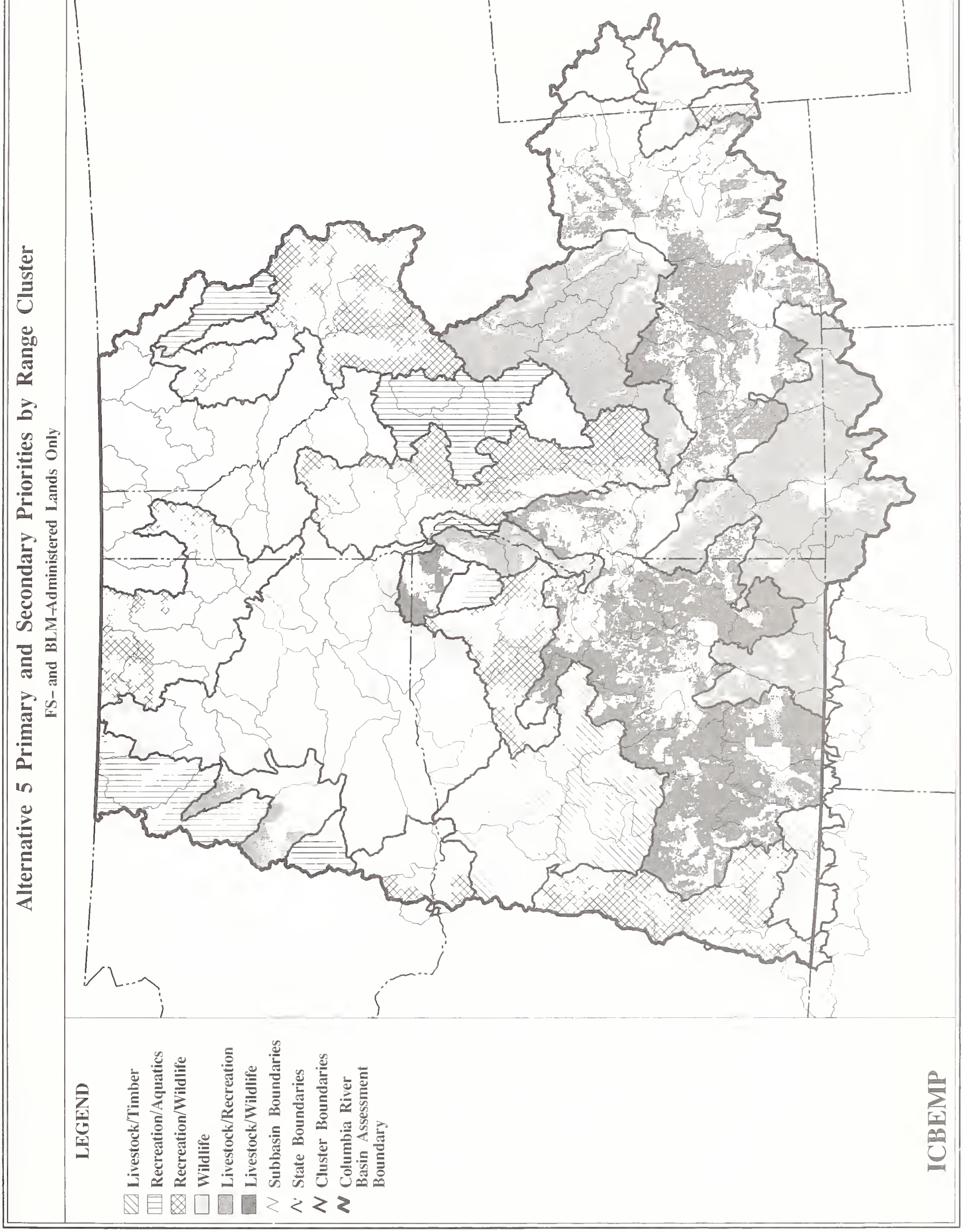
The assignment of the six management emphasis categories by alternative and cluster is displayed in tables 1.3 and 1.4. This information also is depicted in seven alternative strategy maps for forest lands and seven alternative maps for rangeland (for maps depicting general emphasis areas for forest and range clusters for each of the alternatives, refer to chapter 2, Landscape Ecology Evaluation of Alternatives).

For each of the six forest clusters, activity levels of Low (L), Moderate (M), or High (H) were assigned for each of the following management activities: harvest, thin, decrease road density, watershed restoration, prescribed burning, and prescribed fire plans. Table 1.5 presents assumptions and definitions for these forest cluster activity levels. Table 1.6 shows a comparison of alternatives by management activity and forest cluster.

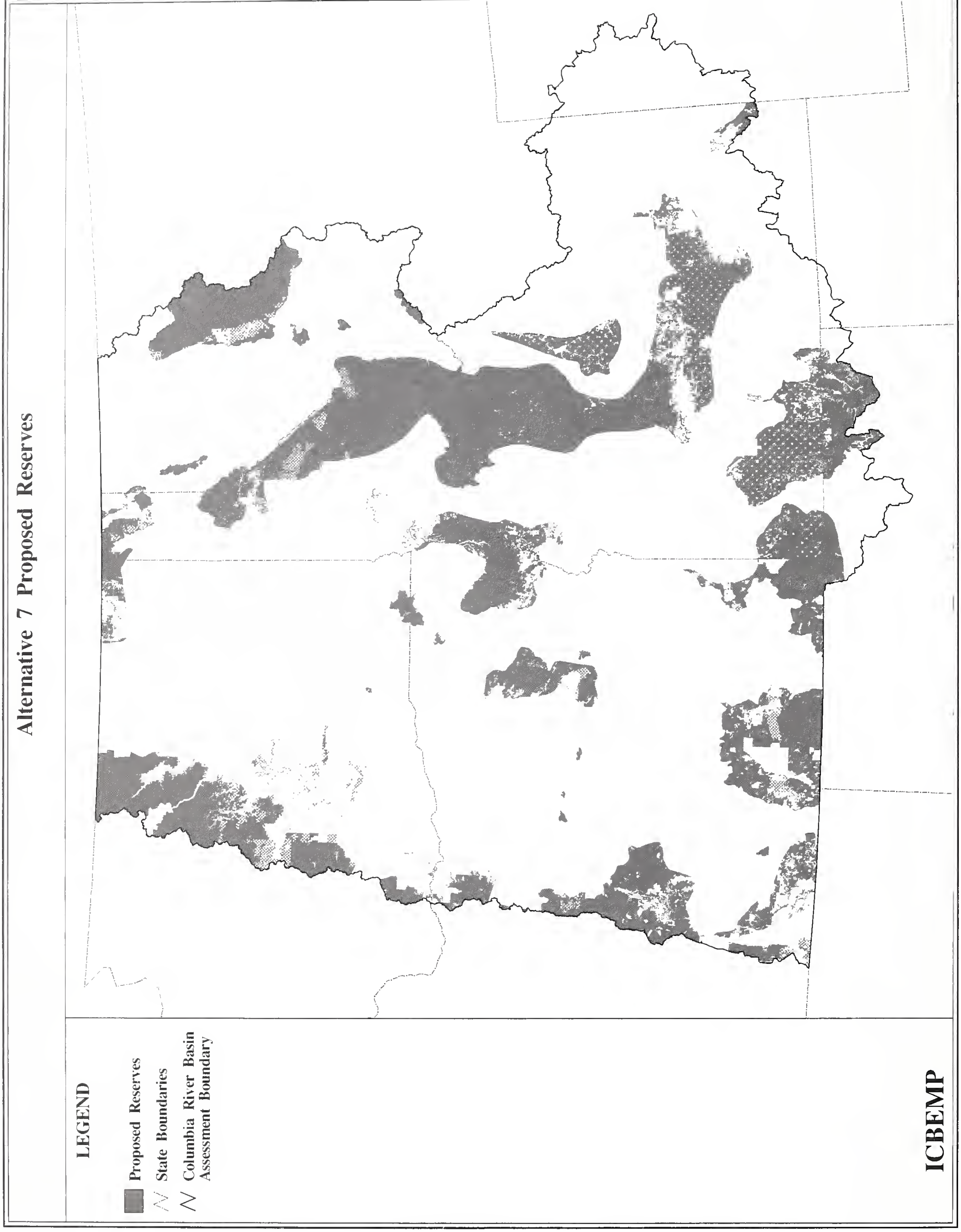
For each of the six range clusters, activity levels of Low (L), Moderate (M), or High (H) were assigned for each of the following management activities: graze livestock, improve rangelands, decrease road density, riparian restoration, prescribed burning, and prescribed fire plans. Table 1.5 presents assumptions and definitions for these range cluster activity levels. Table 1.7 shows a comparison of alternatives by management activity and range cluster.



Map 1.4 – Management emphasis areas (primary and secondary priorities) for forest clusters under Alternative 5 (FS- and BLM-administered lands only).



Map 1.5 – Management emphasis areas (primary and secondary priorities) for range clusters under Alternative 5 (FS- and BLM-administered lands only).



Map 1.6 – Location of Alternative 7 proposed reserves on BLM- and FS-administered lands. Selection of proposed reserves was based on roadless areas greater than 400 hectares (1,000 acres) that were distributed across a range of environments.

Table 1.3 — Overall management strategy by alternative (summary of general management emphasis by forest cluster for the Eastside and UCRB EISs).

Forest Cluster	Alternative 1	2	3	4	5	6	7
Eastside							
1	C	C	R-C	R-C	C	R-C	C
2	P-C	C	R	R	R-C	R	C
3	P	P-C	R	R	R	R	R-C
4	P	P-C	R-P	R	P	R	R-C
5	P	R-C	R	R	R	R	R-C
6	P-C	C	R-C	R	R-P	R-C	C
UCRB							
1	C	C	R-C	R-C	C	R-C	C
2	P-C	C	R	R	R-C	R	C
3	P	P-C	R	R	R	R	R-C
4	P	P-C	R-P	R	P	R	R-C
5	P	R-C	R	R	R	R	R-C
6	P-C	C	R-C	R	R-P	R-C	C

Adapted from the Eastside and Upper Columbia River Basin Preliminary Draft EISs.

Table 1.4 — Overall management strategy by alternative (summary of general management emphasis by range cluster for the Eastside and UCRB EISs).

Range Cluster	Alternative 1	2	3	4	5	6	7
Eastside							
1	P	P-C	R-P	R	R-P	R	R-C
2	C	C	C	R-C	C	R-C	C
3	P-C	C	R-C	R	R-C	R-C	C
4	P	P-C	R-P	R	P-C	R	R-C
5	P	P-C	R	R	P-C	R-C	C
6	P	P-C	R-P	R	R-P	R	R-C
UCRB							
1	P	P-C	R-P	R	R-P	R	R-C
2	C	C	C	R-C	C	R-C	C
3	P-C	C	R-C	R	R-C	R-C	C
4	P	P-C	R-P	R	P-C	R	R-C
5	P	P-C	R	R	P-C	R-C	C
6	P	P-C	R-P	R	R-P	R	R-C

Adapted from the Eastside and Upper Columbia River Basin Preliminary Draft EISs.

Table 1.5 — Cluster activity level assumptions for Alternatives 3 through 7, with definitions.

		Low	Moderate	High
Forest land				
Harvest (commercial) (Percent of all forested area treated per decade)	Alts. 1, 2, 7>	0-4	4-8	8-10
	Alts. 3-6>	0-5	5-9	9-11
Thin (pre-commercial) (Percent of all forested area treated per decade)		0-3	3-6	6-8
Decrease road density (Percent of total road miles reduced per decade)		0-25	25-50	50+ (Change in road density class)
Watershed restoration (Percent of all forested area treated per decade)		0-3	3-6	6-8
Prescribed burning (Percent of all forested area treated per decade)		0-5	5-9	9-11
Prescribed fire plans (Percent of all forest land with implemented plans per decade)		0-20	20-40	40+
Rangeland				
Livestock management (Percent of all rangeland with improved management)		0-6	6-12	12-20
Improve rangelands (Percent of all rangeland treated per decade)		0-4	4-8	8-11
Decrease road density (Percent of total road miles reduced per decade)		0-25	25-50	50+ (Change in road density class)
Riparian restoration (Percent of all riparian areas treated per decade)		0-25	25-50	50-75
Prescribed burning (Percent of all rangeland treated per decade)		0-3	3-6	6-9
Prescribed fire plans (Percent of all rangeland with implemented plans per decade)		0-20	20-40	40+

Harvest. All commercial harvest methods (such as single tree selection, group selection, shelterwood, seed tree, overstory removal, clearcut, and commercial thinning from above or below).

Thin. All pre-commercial thinnings used to alter forest structure, species composition, density, rate of growth, fuel ladders, fire behavior, etc.

Watershed restoration. Includes increased road maintenance, improved road condition (surface and/or drainage), reduced road related erosion, road obliteration, increased large woody material, riparian plantings, in-channel restoration, etc.

Livestock management. A summation of livestock management variables that affect rangeland health, including: grazing systems, changing riparian grazing management, season of use (length and timing), number of head: change of class, distribution, grazing deferment, and herding.

Improve rangelands. Capital investments such as fencing, stock water improvements, seedings, control of invasion or spread of exotics, and non-fire shrub and juniper control.

Decrease road density. Permanent closure of primarily unsurfaced roads.

Riparian restoration. Includes improving road condition (drainage and/or surface), riparian plantings, in-channel restoration, and riparian exclosures.

Prescribed burning. Management ignited fire.

Prescribed fire plan. Allows natural ignition fires to burn when in prescription and/or identifies areas that require prescribed burning.

Table 1.6 — Activity levels by forest cluster and alternative for the Eastside and UCRB EISs.

Action	Alternative 1	2	3	4	5	6	7
Eastside							
Forest Cluster 1							
Harvest	L	L	L	L	L	L	L
Thin	L	L	L	L	L	L	L
Decrease road density	L	L	L	L	L	L	L
Watershed restoration	L	M	M	M	M	M	L
Prescribed burning	L	L	M	H	L	M	L
Prescribed fire plans	H	H	H	H	H	H	H
Alternative 5 Management Priority: Primitive Recreation/Aquatics							
Forest Cluster 2							
Harvest	M	L	L	L	L	L	L
Thin	L	L	L	M	L	M	L
Decrease road density	L	L	M	M	L	M	M
Watershed restoration	L	M	M	H	M	M	L
Prescribed burning	L	L	M	H	M	M	L
Prescribed fire plans	H	H	H	H	H	H	H
Alternative 5 Management Priority: Aquatics/Recreation							
Forest Cluster 3							
Harvest	H	M	M	M	M	L	L
Thin	M	L	M	H	H	M	L
Decrease road density	L	L	M	M	M	H	H
Watershed restoration	L	M	M	M	M	M	L
Prescribed burning	L	L	M	M	M	M	M
Prescribed fire plans	L	L	L	M	M	M	H
Alternative 5 Management Priority: Aquatics/Timber							
Forest Cluster 4							
Harvest	H	M	M	M	H	M	L
Thin	M	M	H	H	H	H	L
Decrease road density	L	L	M	M	L	M	M
Watershed restoration	L	L	L	M	L	M	L
Prescribed burning	L	L	L	M	L	M	M
Prescribed fire plans	L	L	L	M	L	M	M
Alternative 5 Management Priority: Timber/Wildlife							
Forest Cluster 5							
Harvest	H	L	M	M	M	L	L
Thin	M	M	H	H	H	H	M
Decrease road density	L	M	H	H	M	M	H
Watershed restoration	L	L	L	M	M	M	L
Prescribed burning	L	L	M	H	M	H	L
Prescribed fire plans	L	L	M	H	H	H	M
Alternative 5 Management Priority: Timber/Livestock							
Forest Cluster 6							
Harvest	M	L	L	L	M	L	L
Thin	L	L	H	H	M	H	L
Decrease road density	L	L	L	M	L	L	L
Watershed restoration	L	L	L	L	L	L	L
Prescribed burning	L	L	M	M	M	M	M
Prescribed fire plans	L	L	M	M	L	M	M
Alternative 5 Management Priority: Wildlife/Recreation							

Table 1.6 (continued)

Action	Alternative 1	2	3	4	5	6	7
Upper Columbia River Basin							
Forest Cluster 1							
Harvest	L	L	L	L	L	L	L
Thin	L	L	L	L	L	L	L
Decrease road density	L	L	L	L	L	L	L
Watershed restoration	L	M	M	M	M	M	L
Prescribed burning	L	L	M	H	L	M	L
Prescribed fire plans	H	H	H	H	H	H	H
Alternative 5 Management Priority: Primitive Recreation/Aquatics							
Forest Cluster 2							
Harvest	M	L	L	L	L	L	L
Thin	L	L	L	M	L	M	L
Decrease road density	L	L	M	M	L	M	M
Watershed restoration	L	M	M	H	M	M	L
Prescribed burning	L	L	M	H	M	M	L
Prescribed fire plans	H	H	H	H	H	H	H
Alternative 5 Management Priority: Aquatics/Recreation							
Forest Cluster 3							
Harvest	H	M	M	M	M	L	L
Thin	M	L	M	H	H	M	L
Decrease road density	L	L	M	M	M	H	H
Watershed restoration	L	M	M	M	M	M	L
Prescribed burning	L	L	M	M	M	M	M
Prescribed fire plans	L	L	L	M	M	M	H
Alternative 5 Management Priority: Aquatics/Timber							
Forest Cluster 4							
Harvest	H	M	M	M	H	M	L
Thin	M	M	H	H	H	H	L
Decrease road density	L	L	M	M	L	M	M
Watershed restoration	L	L	L	M	L	M	L
Prescribed burning	L	L	L	M	L	M	M
Prescribed fire plans	L	L	L	M	L	M	M
Alternative 5 Management Priority: Timber/Wildlife							
Forest Cluster 5							
Harvest	H	L	M	M	M	L	L
Thin	M	M	H	H	H	H	M
Decrease road density	L	M	H	H	M	M	H
Watershed restoration	L	L	L	M	M	M	L
Prescribed burning	L	L	M	H	M	H	L
Prescribed fire plans	L	L	M	H	H	H	M
Alternative 5 Management Priority: Timber/Livestock							
Forest Cluster 6							
Harvest	M	L	L	L	M	L	L
Thin	L	L	H	H	M	H	L
Decrease road density	L	L	L	M	L	L	L
Watershed restoration	L	L	L	L	L	L	L
Prescribed burning	L	L	M	M	M	M	M
Prescribed fire plans	L	L	M	M	L	M	M
Alternative 5 Management Priority: Wildlife/Recreation							

Adapted from the Upper Columbia River Basin and Eastside Preliminary Draft EISs.

Table 1.7— Activity levels by forest cluster and alternative for the Eastside and UCRB EISs.

Action	Alternative 1	2	3	4	5	6	7
Eastside							
Range Cluster 1							
Livestock management	L	M	M	M	L	M	H
Improve rangelands	L	L	M	M	L	M	L
Decrease road density	L	L	L	H	M	M	M
Riparian restoration	L	L	L	M	L	M	L
Prescribed burning	L	L	M	H	M	H	M
Prescribed fire plans	L	L	M	H	H	H	H
Alternative 5 Management Priority: Livestock/Timber							
Range Cluster 2							
Livestock management	H	H	H	H	H	H	H
Improve rangelands	L	L	L	L	L	L	L
Decrease road density	L	L	L	L	L	L	L
Riparian restoration	L	L	L	M	L	M	L
Prescribed burning	L	L	M	H	M	M	L
Prescribed fire plans	H	H	H	H	H	H	H
Alternative 5 Management Priority: Recreation/Aquatics							
Range Cluster 3							
Livestock management	M	H	H	H	H	H	H
Improve rangelands	L	L	L	M	M	M	L
Decrease road density	L	L	L	M	L	L	M
Riparian restoration	L	M	M	M	L	L	L
Prescribed burning	L	L	M	H	M	M	L
Prescribed fire plans	L	L	M	H	M	H	H
Alternative 5 Management Priority: Recreation/Wildlife							
Range Cluster 4							
Livestock management	L	M	M	M	M	M	H
Improve rangelands	L	L	L	M	L	M	L
Decrease road density	L	L	M	M	L	M	M
Riparian restoration	L	L	L	M	M	M	M
Prescribed burning	L	L	M	M	L	L	L
Prescribed fire plans	L	L	L	M	L	M	M
Alternative 5 Management Priority: Wildlife							
Range Cluster 5							
Livestock management	L	M	M	H	M	H	H
Improve rangelands	L	L	M	M	L	L	L
Decrease road density	L	L	L	L	L	L	L
Riparian restoration	L	L	M	M	M	M	L
Prescribed burning	L	L	M	M	L	M	M
Prescribed fire plans	L	L	L	M	L	M	H
Alternative 5 Management Priority: Livestock/Recreation							
Range Cluster 6							
Livestock management	L	M	M	H	M	H	H
Improve rangelands	L	L	M	H	M	M	L
Decrease road density	L	L	L	M	L	M	M
Riparian restoration	L	L	M	M	M	M	M
Prescribed burning	L	L	L	L	L	L	L
Prescribed fire plans	L	L	L	L	L	L	M
Alternative 5 Management Priority: Livestock/Wildlife							

Table 1.7 (continued)

Action	Alternative 1	2	3	4	5	6	7
Upper Columbia River Basin							
Range Cluster 1							
Livestock management	L	M	M	M	L	M	H
Improve rangelands	L	L	M	M	L	M	L
Decrease road density	L	L	L	H	M	M	M
Riparian restoration	L	L	L	M	L	M	L
Prescribed burning	L	L	M	H	M	H	M
Prescribed fire plans	L	L	M	H	H	H	H
Alternative 5 Management Priority: Livestock/Timber							
Range Cluster 2							
Livestock management	H	H	H	H	H	H	H
Improve rangelands	L	L	L	L	L	L	L
Decrease road density	L	L	L	L	L	L	L
Riparian restoration	L	L	L	M	L	M	L
Prescribed burning	L	L	M	H	M	M	L
Prescribed fire plans	H	H	H	H	H	H	H
Alternative 5 Management Priority: Recreation/Aquatics							
Range Cluster 3							
Livestock management	M	H	H	H	H	H	H
Improve rangelands	L	L	L	M	M	M	L
Decrease road density	L	L	L	M	L	L	M
Riparian restoration	L	M	M	M	L	L	L
Prescribed burning	L	L	M	H	M	M	L
Prescribed fire plans	L	L	M	H	M	H	H
Alternative 5 Management Priority: Recreation/Wildlife							
Range Cluster 4							
Livestock management	L	M	M	M	M	M	H
Improve rangelands	L	L	L	M	L	M	L
Decrease road density	L	L	M	M	L	M	M
Riparian restoration	L	L	L	M	M	M	M
Prescribed burning	L	L	M	M	L	L	L
Prescribed fire plans	L	L	L	M	L	M	M
Alternative 5 Management Priority: Wildlife							
Range Cluster 5							
Livestock management	L	M	M	H	M	H	H
Improve rangelands	L	L	M	M	L	L	L
Decrease road density	L	L	L	L	L	L	L
Riparian restoration	L	L	M	M	M	M	L
Prescribed burning	L	L	M	M	L	M	M
Prescribed fire plans	L	L	L	M	L	M	H
Alternative 5 Management Priority: Livestock/Recreation							
Range Cluster 6							
Livestock management	L	M	M	H	M	H	H
Improve rangelands	L	L	M	H	M	M	L
Decrease road density	L	L	L	M	L	M	M
Riparian restoration	L	L	M	M	M	M	M
Prescribed burning	L	L	L	L	L	L	L
Prescribed fire plans	L	L	L	L	L	L	M
Alternative 5 Management Priority: Livestock/Wildlife							

Adapted from the Upper Columbia River Basin and Eastside Preliminary Draft EISs.

Evaluation of Alternatives Process

Predicting effects, outcomes, and consequences for each alternative required an understanding of current conditions and planned activities. Figure 1.1 shows the flow of information and logic used to project outcomes. The science assessment provided the description of current conditions, risks, and opportunities at the broad scale within the Basin. From this the EIS teams assigned management emphasis and activity levels they believed would appropriately address the risks and opportunities consistent with the underlying theme of the alternative. This in turn led to establishing objectives and standards for specific areas, again, consistent with the underlying theme. Although these were not fully developed, the evaluation of effects required understanding, at least to some degree, how implementation and monitoring might be forthcoming for each alternative. Where no specific direction was provided on these subjects, the SIT made assumptions so that outcomes could be projected.

To evaluate the alternatives, each of the five staff areas of the SIT (landscape ecology, terrestrial, aquatic, social, and economic) used methodology specific to and appropriate for its discipline. However, this meant necessary differences in evaluation techniques. Consequently, each staff area chapter contains a description of the methodology, specific to that discipline, used in the evaluation. The SIT was instructed to predict ecological outcomes of the alternatives without regard to potential political barriers to implementation. There is concern among the SIT that potential challenges to implementation, such as adequate budget allocations, may occur. The analyses do not reflect or include these concerns. However, the concerns were relayed to the EIS teams.

Important changes have occurred in the EIS alternatives between the February 1996 Preliminary Draft EISs, which were evaluated by the SIT, and the Draft EISs as they are at the time of this publication. These changes, and their effect on the evaluation, are summarized in Chapter 8.

The objectives and standards for the EISs, as well as effects, will continue to evolve until the Final Environmental Impact Statements and Records of Decision. The reader is referred directly to the Upper Columbia River Basin and Eastside EISs for insights into changes in the objectives and standards, and subsequent changes in effects, consequences, and outcomes that have occurred since publication of this document.

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CHAPTER 2

Landscape Ecology Evaluation of the Preliminary Draft EIS Alternatives

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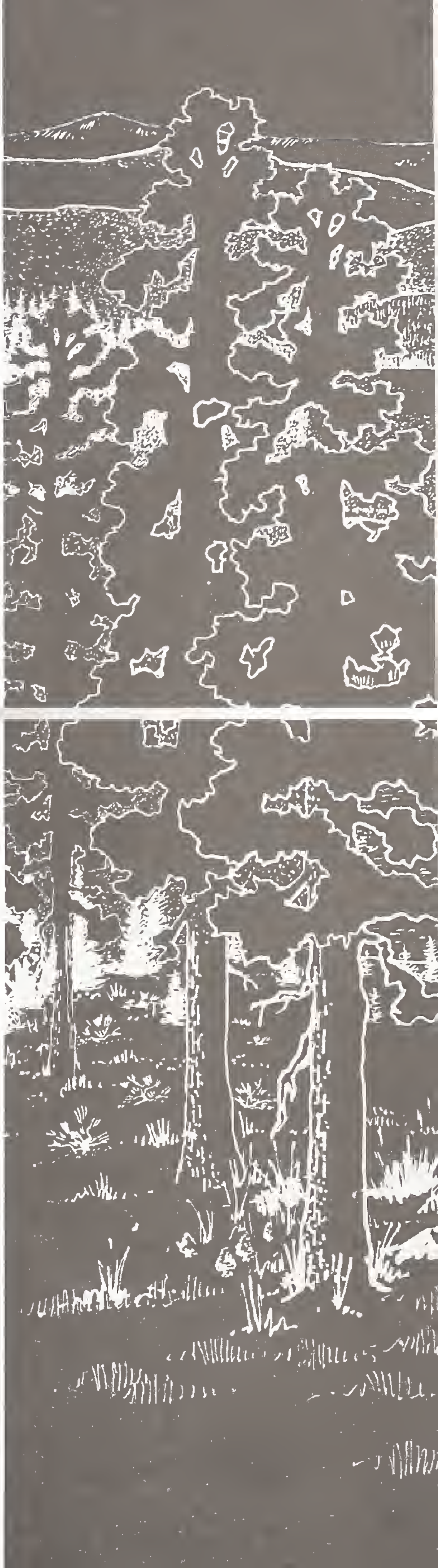

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Introduction

The landscape evaluation of alternatives for the Eastside and Upper Columbia Preliminary Draft Environmental Impact Statements (PDEISs) presents a comparison of outcomes for key landscape variables across the seven alternatives for the Basin.[1] The evaluation process involved simulation and analyses of predicted effects, and also qualitative evaluation, of the alternatives as described in direction to the Science Integration Team (SIT) in a letter dated February 26, 1996.[2] The relationship of the Evaluation of Alternatives to both the assessment and the EIS alternatives is shown in figure 2.1. The relation between the assessment data and EIS scale is shown in figure 2.2.

This chapter has seven sections:

1) Overview of the landscape ecology evaluation of alternatives, including a statement of assumptions.
2) Overview of the simulation methods used for predicting spatial and temporal responses to different levels of management treatments and disturbances.
3) Responses of vegetation to management and other disturbances.
4) Responses of terrestrial vegetation and habitats, and their interrelationships.
5) Evaluation of vegetation response and disturbance patterns.
6) Effects of selected noxious weeds and cheatgrass on rangeland in the Basin.
7) Summary, including conclusions.

The methods used for the evaluation of alternatives involved mapping land management and disturbance prescription response and assumptions based on alternatives developed by the EIS teams. Background information on the development, characteristics, and response of various landscapes to the different types of prescriptions is documented in *Landscape Dynamics of the Basin* (Hann and others, in press), Chapter 3 of the *Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins* (Quigley and others, in press). Vegetation and disturbance responses are modeled using the Columbia River Basin SUccession Model (CRBSUM) (Keane and others 1996), in association with the Columbia River Basin Landscape Analysis Data Base (CRBLAD) (Gravenmier and others, in press), and a variety of associated simulation methods (Hann and others 1997).

The purpose of landscape dynamics evaluation is to predict the effects of the alternatives on landscape components (table 2.1). These components vary depending on the management emphasis of the alternatives (table 2.2; appendix 2-C). The seven different alternative themes in the preliminary draft EIS have a broad range of outcomes considering the variation in landscape components and the differences in spacial location and effects through time.

Landscape Evaluation Process

Direct linkages between each alternative's desired future conditions (DFCs),[3] objectives and standards (appendix I), and the emphasis areas by

[1]The Basin is defined as those portions of the Columbia River basin inside the United States east of the crest of the Cascades and those portions of the Klamath River basin and the Great Basin in Oregon.

[2]The version of the EIS alternatives under evaluation here was presented to the SIT on February 26, 1996 in a package titled "Alternatives Package for SIT Evaluation for Eastside and UCRB EISs." On file with: U.S. Department of Agriculture, Forest Service; U.S. Department of Interior, Bureau of Land Management; Interior Columbia Basin Ecosystem Management Project, 112 E. Poplar, Walla Walla, Washington, 99362.

[3]Desired Future Condition (DFC) is a portrayal of the land, resource, or social and economic conditions that are expected to result in 50 to 100 years if objectives are achieved; in this document, portrayed as a range of conditions. A vision of the long-term condition of the land. See appendix I for a description of the DFCs for each of the alternatives.

forest and range clusters in the EISs were not always clear. For example, many of the objectives and standards were written for fine-scale features that were not necessarily linked, in either a spatial or temporal context, with the broad-mid-fine scale hierarchy depicted in figure 2.2. Many of the standards apply single size/state conditions to ecological functions that are inherently variable. As such, standards applicable to the finer scales may be unrelated to the mid and broad scale. As an alternative is implemented, potential for conflict between the overall theme, objective, forest and range cluster emphasis, activity levels, mid-scale patterns, and the finer-scale standards exists. To reduce this potential for conflict and proceed with outcome projections, it was necessary to make assumptions relative to management prescriptions, management activities, and ecological "fit" of the single size/state standards. The purpose of the assumptions was to provide clarity about implementation of an alternative.

Treatment prescriptions were assumed to be either traditional or ecological, or to have minimal treatment (as in the reserves) (table 2.3). Treatment emphasis differs among alternatives. Management prescriptions emphasized in Alternatives 1 and 2 are traditional, Alternatives 3 through 6 are ecological, and Alternative 7 is a mix of reserve and ecological. It was also assumed that Alternatives 1 and 2 would be implemented in a traditional programmatic allocation with no emphasis on multi-scale relationships, while Alternatives 3 through 7 would be implemented with varying emphasis on interconnected spatial and temporal scales (figure 2.2).

Assumptions About Landscape Integrity[4] and Management Approaches

Two important measures of landscape integrity at all scales are: (1) ecosystem integrity (both ecological and socioeconomic), and (2) diversity of native habitats and associated processes. Generally, in wildland environments, native communities are more productive and more resilient to disturbances such as fire, drought, and insects/disease, than are communities that have been simplified by traditional agricultural, forest, or range management, or by conversion to exotic[5] communities. As native habitats are simplified or converted to exotics, there is a decline in the native fauna and flora that depend on these habitats. Management that conserves native habitats avoids further declines in native species, productivity and resiliency.

Listed below are the assumptions about the types of management that would be used to implement the alternatives. The assumptions are expectations of how management would sustain landscape integrity on BLM- and FS-administered lands.

Landscape Integrity Assumption 1: Landscape Approach to Management — Through time, the management of BLM- and FS-administered lands shifts increasingly toward a landscape approach. Under this assumption, the BLM- and FS-administered lands are managed as a whole within watersheds and as connected lands between watersheds. Forests and rangelands intermingled within or between watersheds are managed on an integrated basis for both resources and habitats. Hydrologic and riparian regimes within watersheds are managed as integral networks.

Managers recognize that ownership pattern strongly affects implementation of a landscape approach. Watersheds dominated by continuous BLM and FS oversight would have the best chance for achieving long-term desired patterns, while watersheds with mosaic or mixed ownership would have less chance. In contrast, managers recognize that disjunct BLM or FS parcels in environments with little BLM or FS ownership may be highly valuable for remnant native habitats.

[4]Landscape integrity is synonymous to landscape health based on proper functioning systems at a landscape scale. See Chapter 3 of the landscape assessment (Hann and others, in press) for definitions and discussion.

[5]Exotics are non-native plants; biota from a different area or environment that migrated to the area with the assistance of humans.

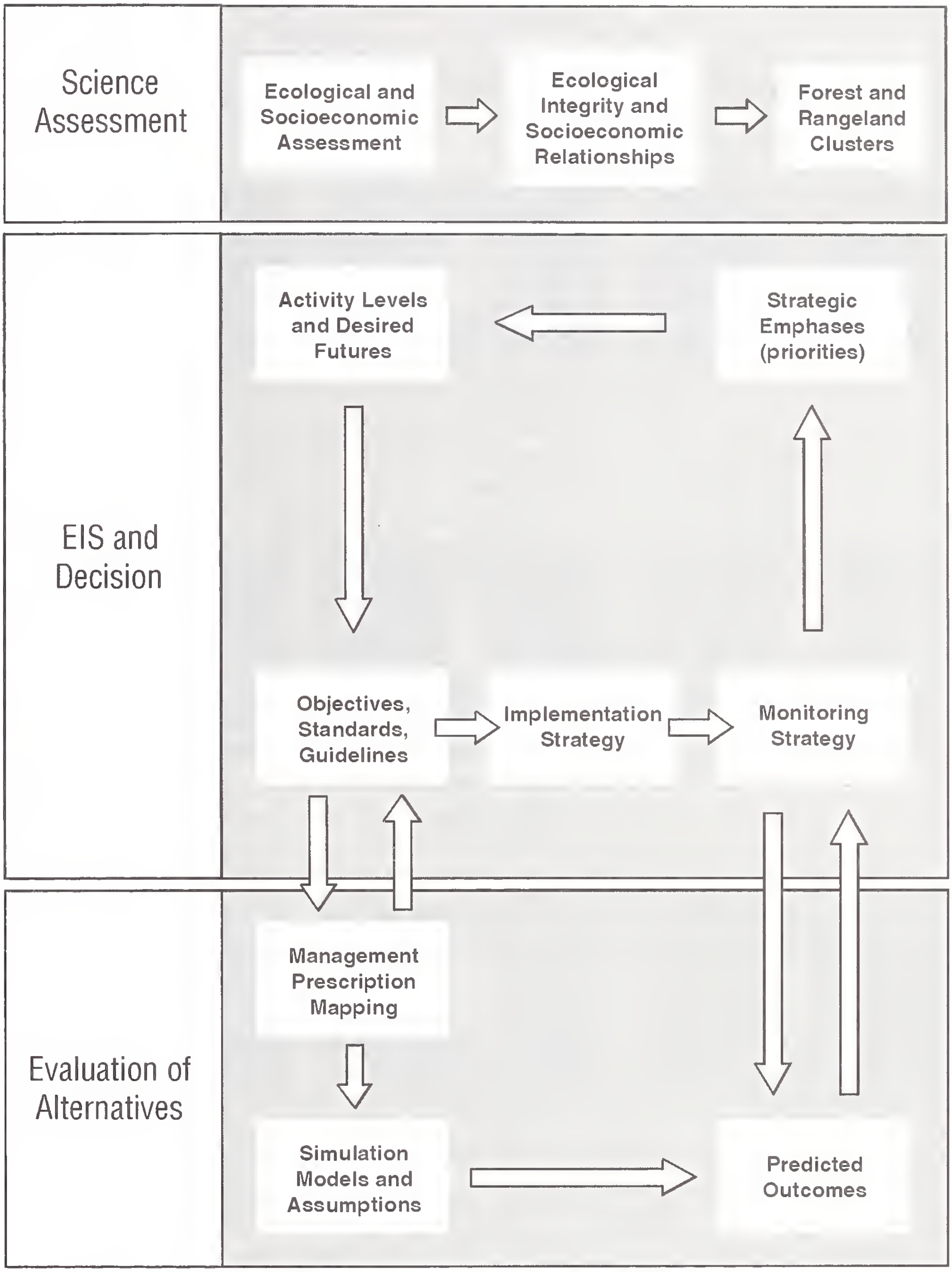


Figure 2.1 — Relationship of Evaluation of Alternatives to the Science Assessment and EISs.

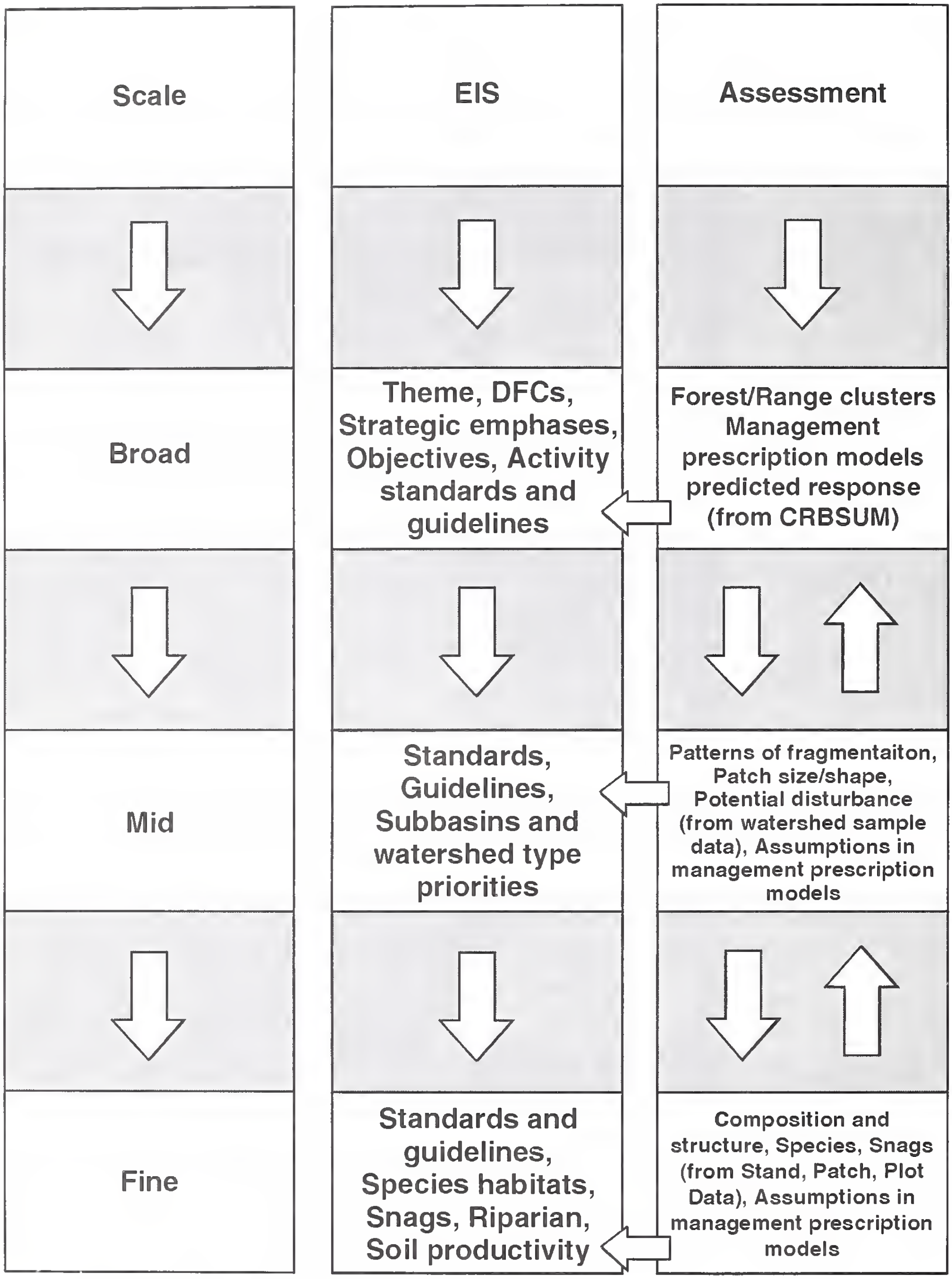


Figure 2.2 — Relationship between Assessment data and EIS scales.

Landscape Integrity Assumption 2: Successful Ability to Mimic/Represent Processes — Managers develop the ability to assess and implement landscape management to more closely resemble native landscape mosaics, biotic community structure and composition, and processes over space and time. This does not infer that these conditions are representative of the historical range of variability (HRV), which is the variability of regional or landscape composition, structure, and disturbances during a period of time for several cycles of the common disturbance intervals and for similar environmental gradients.[6] In essence, managers promote a balance of land use and ecosystem integrity that sustains native habitats while producing human resource values within the limitations of biophysical systems and inherent disturbance processes.

Emphasis should be placed on understanding and managing within the limitations and options of the biophysical template (BPT)[7] to conserve processes associated with native composition and structure. The biophysical template refers to an area's mosaic of inherent patterns of composition and structure, including environmental gradients and dynamics of disturbance that developed through evolutionary time. This concept, developed from work by Jenny (1958) and Major (1951), is described in detail by Hann and others (in press).

The historical range of variability provides an assessment tool to monitor biodiversity for either departure, or similarity of conditions or processes, to native pre-Euro-American settlement. HRV also provides a useful tool for understanding cause and effect, and thus, risk of undesired outcomes. Managing for HRV in a regime that has a substantially unbalanced biophysical composition could cause changes detrimental to native conditions and processes. Unbalanced regimes include areas having: exotic species, historically common species that are now rare, disrupted hydrologic systems, high fuel loading, simplified native diversity, composition and structure that are incompatible with the biophysical succession/disturbance[8] regime, or have degraded soils. Management for HRV is not appropriate for many types of land use that balance restoration and mitigation to sustain ecological integrity and native habitats with socioeconomic resiliency.

Representation of native conditions and processes is generally most successful in natural and natural/human-influenced management areas. In these areas, managers utilize planned and unplanned prescribed fire and flexible wildfire suppression strategies to represent native landscape patterns and represent native fire regime severity and intervals. Livestock grazing is managed in these areas to generally preclude departure from the native succession/disturbance regimes. However, the transition to native patterns occurs carefully to avoid loss of key elements (such as large trees or stronghold rare aquatic populations), site capability, or invasion of exotic species.

On human-influenced management areas, managers use various treatments to produce the types of communities and landscape structures somewhat characteristic of the native regime. These

[6]Historical range of variability (HRV) refers to the "pre-Euro-American settlement" or "native" regime. It is not synonymous with the historic or historical time period which we define as beginning circa 1850.

[7]The biophysical template can be visualized as the biological, physical, and disturbance characteristics of an environment over a period of relatively stable climate. It is the current expression of the collective adaptations of species to competition, disturbances, and the physical environment. It is also the current expression of the soils, landform, and hydrologic system development in response to biotic and geomorphologic processes. Biophysical templates have characteristic succession and disturbance regimes that are governed by the interaction between biotic and abiotic components. They may be altered by any disturbance (or repeated disturbances) that change the relationships between the biotic and abiotic systems.

[8]We provide a classification that integrates aquatic and terrestrial systems, and succession/disturbance. We classified succession/disturbance regimes according to 1) the severity of the disturbance relative to the subsequent change of community composition and structure, 2) the time interval between disturbances, 3) the resiliency or rate of community development in response to the disturbance, and 4) the mosaic created by disturbance through time.

Table 2.1 — Landscape components evaluated for alternatives.

Landscape Component
• Management prescription assumptions.
• Succession/disturbance trends and regimes.
• General trends of fine-scale variables such as snags, upland down wood, riparian down wood, forest riparian, range riparian, and vegetation mosaic patterns.
• Similarity of current vegetation and alternative vegetation to historical range of variability.
• Physiognomic types by potential vegetation group changes.
• Physiognomic type transitions from historical to current and current to 100 years.
• Terrestrial community changes.
• Terrestrial community departure of current from historical range and alternatives from historical range.
• Forest harvest.
• Forest thinning.
• Forest prescribed fire.
• Forest insect/disease susceptibility.
• Forest wildfire.
• Forest wildfire crown susceptibility.
• Range improvements such as seeding, spraying, and woodland cutting.
• Range allotment plan revision assumptions.
• Range prescribed fire.
• Range wildfire.
• Range grazing effects.
• Exotic plants, noxious and undesirable weeds.
• Total wildfire.
• Total prescribed fire.
• Wildfire cost.
• Prescribed fire cost.
• Total fire management cost.
• Wildfire intensity.
• Prescribed fire smoke.
• Wildfire smoke.
• Total smoke and effect on visual condition.
• Ecosystem productivity processes.

treatments may include timber harvest, livestock grazing, prescribed fire, wildfire suppression strategies, range cultural treatments, and forest cultural treatments. Monitoring and evaluation are conducted to compare the outcomes and make improvements in the landscape and community-level treatments.

Landscape Integrity Assumption 3: Hierarchical Assessment, Implementation, Monitoring, and Evaluation — Inventory programs and methods are redesigned based on landscape processes and gradients to integrate ecological conditions and resource values. Vegetation mapping emphasizes techniques such as remote sensing using multi-scale satellite imagery to

provide information that is consistent, continuous, and current. Classification methods for mapping vegetation use hierarchies based on the vegetation's composition and structure. Landscape planning is accomplished in a hierarchical manner reflecting integrated broad- to fine-scale findings in project design. Activities and changes are monitored by sampling mid- and fine-scale data, and then statistically extrapolated to support broad-scale monitoring. The evaluation process integrates broad- to fine-scale landscape conditions to evaluate change, as well as the effects of cumulative activities.

Landscape Integrity Assumption 4: Prioritization and Integration of Activities — Through time, activities that produce commodities and restore landscape conditions are prioritized and then implemented with emphasis on achieving an integrated landscape and maintaining aquatic, terrestrial, and

Table 2.2 — Alternatives by management emphasis and ecological interpretation.

Alternative	Alternative Group[1]	Management Emphasis[2]	Management Interpretation
Alt. 1	A	Existing BLM/FS Plans. Commodity with minimal reserves.	<u>*Traditional prescriptions:*</u> Produce and sustain commodity values. Traditional commodity and wilderness management and wildfire suppression.
Alt. 2	A	Interim BLM/FS Plans. Commodity with reserves.	<u>*Traditional prescriptions:*</u> Provide protection in aquatic riparian ecosystems; same as Alternative 1 in other areas. Reduce traditional commodity and continue traditional wilderness management and wildfire suppression.
Alt. 3	B	Restore/produce with local priority.	<u>*Ecological prescriptions:*</u> Restore, produce, and conserve. Restore and/or conserve areas that have local high priority and produce commodities.
Alt. 4	C	Restore with Basin priority.	<u>*Ecological prescriptions:*</u> Restore, produce, and conserve. Restore and/or conserve areas according to Basin priorities and produce commodities.
Alt. 5	B	Restore/produce with economic efficiency priority.	<u>*Ecological prescriptions:*</u> Conserve, produce, and restore. Produce and/or restore where economically efficient in the Basin and conserve with Basin priorities.
Alt. 6	C	Restore with adaptive management and with Basin priority.	<u>*Ecological prescriptions:*</u> Restore, produce, and conserve with adaptive management. Restore and/or conserve areas based on Basin priorities, and produce commodities with reduced rates in higher risk areas.
Alt. 7	B	Reserve the undeveloped areas; restore/ produce in other areas.	<u>*Ecological/reserve prescriptions:*</u> Minor management in reserves with minimal investment in fire suppression and restoration; same as Alternative 3 in other areas.

[1]Alternative Group:

A = Alternatives with traditional prescriptions that have high departure from native succession/disturbance regimes.

B = Alternatives with ecological prescriptions that have moderate departure from native succession/disturbance regimes due to spatial and temporal fragmentation in response to emphasis on local priorities (alternative 3); economic priorities (alternative 5), or reserve management (alternative 7).

C = Alternatives with ecological prescriptions that have low departure from native succession/disturbance regimes.

[2]Management emphasis – see appendix 2-C for description of catagories; see table 2.4 footnote 1 for definitions.

hydrologic integrity and social and economic resiliency. These priorities are set regionally using assessment results at the subbasin [4th-field Hydrologic Unit (HUC)[9]] level and associated interpretations (see Quigley and others 1996). These priorities are placed in context with national and international integrated priorities scaled at the Basin level. Priorities are set at the watershed and subwatershed scale using a similar analytical process for 5th- and 6th-field HUCs within subbasins. The process of ecosystem risk and opportunity analysis follows the concepts of assessment for proper functioning landscape patterns as described in the Landscape Dynamics assessment by Hann and others (in press).

Landscape Integrity Assumption 5: Concentration of Activities Temporally and Spatially — Through time, the implementation of activities such as access for timber harvest, use of prescribed fire, and road access management tends to be concentrated in time and space to better reflect patterns of the inherent disturbance regimes and biophysical template. In general, disturbances at the watershed level are consistent with the template and concentrated within periods of a few years, across a relatively large part of the watershed, and with relatively long time intervals of little or no disturbance. Management for individual activities occurs over larger areas to represent natural disturbances and

[9]As part of the need to integrate terrestrial and aquatic ecosystem information to address many of the issues related to the biophysical and social ecosystem components within the Basin, it was necessary to develop consistent and continuous delineations of watersheds across the assessment area. A total of approximately 7,500 base unit subwatersheds (6th-field HUCS) were identified within the Basin. Watersheds by their very nature are a nested hierarchy; a small watershed is contained within a larger watershed, which, in turn, is contained within a still larger one. The numeric coding system was based on the one prepared by the USGS in cooperation with the Water Resources Council. This system consists of fields of paired digits referred to as Hydrologic Unit Code (HUC). The first four fields (8 digits) are assigned and published by the USGS and are commonly referred to as 4th-field HUCs. The ICBEMP watershed delineation further subdivides 4th-field hydrologic code units into smaller, nested 5th-field and 6th-field hydrologic units. It is the 6th-field hydrologic unit (referred to as 6th-field HUC or subwatershed) that was used as the basic characterization unit for the ICBEMP assessment effort.

Table 2.3 — General descriptions of traditional, ecological, and reserve management prescriptions.

Management Prescription	Description
Traditional	Emphasis on managing primary natural resource variables related to providing for human needs (such as wood production, livestock, recreation, visual condition, water, and big game). Manage as an aggregation of effects from a fine scale (such as stands, allotments, campgrounds, and point source) with no broader scale context. Measure sustainability directly from the variables. Manage to control landscape dynamics to maximize production of primary natural resource variables.
Ecological	Emphasis on managing relationships of humans and other species with their environments (recognizing primary natural resource variables and their relationship with ecological composition, structure, and function). Manage using broad spatial and temporal scales to provide context for management of finer scale patterns. Measure sustainability from both primary natural resource variables and ecological processes. Manage landscape succession/disturbance regimes to shift current spatial patterns and temporal trajectories to fit the basic biophysical template and represent native succession/disturbance regimes.
Reserve	Emphasis on minimal production of natural resource commodity variables and minimal direct management treatments. Manage landscape dynamics to allow the current spatial patterns to achieve their own balance with the environment through time.

to maintain structures that "fit" the biophysical template. This management shift, prioritized through time, would result in improved landscape integrity and more efficient production of resource values.

Landscape Integrity Assumption 6: Road Management — New road construction is prioritized for low sensitivity landtypes and 6th-field HUC subwatersheds within the context of objectives specifying no net increase in road densities in any cluster or in applicable subwatersheds. Road management prioritizes reductions in road density in moderate-to-high sensitivity watersheds and landtypes. Permanent roads are surfaced with asphalt or stable aggregate to reduce the need for grading and cut/fill slopes, and ditches are stabilized with herbaceous cover. Drainage systems and culverts are reconstructed, as needed, and maintained to eliminate delivery of sediment into streams. Bridges and culverts are reconstructed, as needed, in locations that reduce impacts on the river and stream channel dynamics.

Landscape Integrity Assumption 7: Fire Management — The fire suppression and fuels programs are managed to attain landscape conditions consistent with inherent disturbance processes and within the capabilities of the biophysical system. Fire suppression resources are maintained to manage wildfires when needed. During periods when wildfire activity is low, these resources are used for prescribed fire and fuel management. Large wildfires are managed in the context of the total landscape and risk to lives, property, and resource investments, with a full range of strategies capable of achieving landscape vegetation and fuel management objectives, as well as wildfire suppression.

Wildfire management strategies fully recognize the dangers of various fuel and weather conditions and place emphasis on the safety of firefighters, as well as the need to meet fire suppression objectives. Fuels in wilderness and semi-primitive areas are managed with an active prescribed fire program that includes unplanned ignitions where appropriate, and planned ignitions where needed, to trend toward the appropriate landscape pattern of succession/disturbance regimes and to meet resource objectives.

Landscape Integrity Assumption 8: Forest and Range Integrated Landscape Management — Management activities are designed and implemented to integrate planning, implementation, and monitoring for ecological integrity, while considering social and economic resiliency. Management emphasis shifts towards managing landscape processes to provide the most effective "fit" with the biophysical template and associated pattern of succession/disturbance regimes.

Management would improve the integrity of many processes by managing activities such as harvest, prescribed fire, wildfire, and grazing to mimic or represent effects of native succession and disturbance processes at the physiognomic level. Key processes include photosynthesis, decay, fire, insect/disease, and herbivory. Landscape patterns of succession/disturbance regimes provide a basis for integrated improvement of integrity by "best fit" of treatments to their appropriate landscape position and scale. Through time, management activities that affect these processes would provide for a supply of dead and live standing and down wood that structurally represent the essential range of associated habitats and conditions for nutrient cycling.

By considering net primary productivity and water/nutrient balance at levels consistent with the native system, management would provide for productivity and stress levels consistent with biophysical limitations. Managing for soil cover and structure as appropriate for the biophysical template would provide for long-term soil productivity, and also limit erosion and sediment delivery. Designing roads that reduce sediment delivery and bare soil would improve hydrologic integrity. Monitoring of multi-scale landscape patterns and adjusting for landscape processes would change the trends in community and landscape patterns to be more consistent with inherent disturbance processes. The broad-scale composition

of physiognomic types would become more similar to the biophysical template, in both structure and composition of communities, and landscape patterns of succession/disturbance regimes, at the watershed scale.

Landscape Integrity Assumption 9: Management of Different Potential Vegetation Groups (PVGs)[10] — Management of potential vegetation groups is done in a landscape context with their adjacent PVGs. There is emphasis to avoid both the introduction and spread of exotic plants and noxious weeds. Any seeding that is deemed necessary would use native species whenever possible; any non-native species used should, when possible, be ones that do not produce viable seed. Desired non-native species are used for restoration only if there are no native species that can compete with undesirable exotics or that will stabilize the site.

Over time, the integrity of potential vegetation groups would improve by addressing conditions related to current integrity problems. By improving inventory, remote sensing, and ecological modeling, management would develop a better understanding of potential vegetation groups and their relationships to landscape patterns and succession/disturbance regimes at finer scales.

Through time and with the use of prescribed fire, flexible strategies on wildfire management, noncommercial tree cutting, commercial harvest, livestock grazing, and other treatments, the mix of physiognomic types would show a trend toward a mix consistent with properly functioning landscape systems (also equivalent to landscape health).

Additional information about assumed management of potential vegetation groups is included in appendix 2-A.

[10]A PVG is a group of potential vegetation types (PVTs) that have similar environmental conditions and are dominated by similar types of plants. A potential vegetation type is a physical and biological environment that produces a kind of vegetation, such as the dry Douglas-fir type.

Simulation Strategies Used for Evaluation of Alternatives

The basic platform we used for simulating the vegetation composition and structure and its associated disturbance for the preliminary draft EIS alternatives was a spatial and temporal model called the Columbia River Basin SUccession Model (CRBSUM) (Keane 1996), along with the Columbia River Basin Landscape Analysis Data Base System (CRBLAD) (Gravenmier and others, in press) and other associated models and data (Hann and others 1997). CRBSUM predicts disturbance dynamics and vegetation response through time at a landscape level. Differences in alternatives were simulated by using various combinations of types, rates, and spatial allocations to subbasin clusters, of disturbances. The data system, called CRBLAD, predicts many other attributes that aid in landscape, aquatic, terrestrial, social, and economic assessment.

Management disturbances assessed included livestock grazing, timber harvest and thinning, range improvements, prescribed fire, and fire suppression emphasis; other disturbances included wildfire, insect and disease mortality, and drought. The simulations of the various alternatives showed how different types of disturbance interact to produce various temporal and spatial mixes of vegetation types and associated attributes. The response for a given spatial location varied depending on the current and potential vegetation types, the type of management assigned to the area in the alternative, and the kinds of disturbances projected in the simulation period.

Prescription Models

The types and rates of disturbances varied among the different potential vegetation types and prescription models (Hann and others, in press; Long and others 1996). While each prescription represented a specific type of management, they generally fell into one of five broad categories of management:

- Traditional management of vegetation for production of commodities using traditional treatments and suppression of wildfires.
- No management of vegetation in reserves (roadless areas), and suppression of wildfires within the National and Regional Interagency fire policy requirement.
- Traditional protection for visual quality or habitat objectives and suppression of wildfires while producing minimal commodities.
- Ecological approach to conserving a balance of ecosystem integrity and native diversity while meeting human resource objectives, and integrating wildfire management with prescribed fire management in roaded areas.
- Ecological approach to restoration of landscapes to achieve a balance between ecosystem integrity and native diversity while meeting human resource objectives, and integrating wildfire management with prescribed fire management in roadless areas.

There were 18 prescriptions: the historical regime and 17 simulations representing various types of management (table 2.4). The historical regime was simulated once for a 100-year period and a second time for a 400-year period. These simulations used the historical (circa 1850s) map as a starting input layer and modeled a 100-year historical range of variability (HRV) and a 400-year HRV.[1]

[1]The HRV (Morgan and others 1994) provides a means of understanding succession/disturbance and the biodiversity relationships of paleoecological and historic systems. It incorporates the relationships between the energy of the system in terms of processes of biomass accumulation and the processes of disturbance that convert or physically transport biomass. HRV can serve as a tool for understanding the causes and consequences of change in ecosystem characteristics over time as well as serve as a benchmark for understanding the effects of human-induced changes of biophysical systems. We simulated the HRV by developing pre-Euro-American settlement succession/disturbance models for each potential vegetation type and simulating change over a 100- or 400-year period from the historical vegetation map (Long and others 1996).

The management regimes were simulated for a 100-year period from current. All prescriptions were simulated for all lands in the Basin and data were stored in a prescription database (Hann and others, in press; Hann and others 1997).

Each prescription had a different response used to simulate the application of management activities and associated effects. The historical prescription set was used to define the historical range of variability (HRV) for the Basin, and also for each EIS area, management class, potential vegetation group (PVG), and subbasin. The historical prescription set was not appropriate for current management due either to differences in objectives and current conditions, or to a change in the response of the potential vegetation (Hann and others, in press).

Table 2.4 — Landscape management prescription (Rx) map symbol legend names.

Prescription Type	Rx	Legend Name
*	HI	Prescription set to model 100-year and 400-year simulations of HRV.
Ecological		
*	A1	Restoration[1] with PNF/P[2]
*	A2	Roaded Land High Restoration with Production[1]
*	A3	Roaded Land High Restoration with Production and Area or PVG Emphasis
*	N1	Conservation[1]
*	N4	Roaded Land Moderate Restoration with Production
Traditional Reserve		
*	C1	Roadless Land with Moderate Fire Suppression
*	N6	Roadless Land with Moderate Fire Suppression and PNF/U[3]
*	P1	Roadless Land Reserve with Moderate Fire Suppression
Traditional Commodity		
*	C2	Roaded Land High Commodity with Low Ecological Mitigation
*	C3	Roaded Land High Commodity with No Ecological Mitigation
*	N3	Roaded Land Moderate Commodity with Low Ecological Mitigation
*	N5	Roaded Land Moderate Commodity with High Exotic Weeds
*	N8	Roaded Land Moderate Commodity with Moderate Ecological Mitigation
*	P3	Roaded Land Very High Commodity with No Ecological Mitigation
Traditional Commodity in Sensitive Areas		
*	N2	Sensitive Visual[4] Area with Moderate Harvest & Livestock
*	N7	Sensitive Visual Area with Moderate Harvest & Low Livestock
	P2	Sensitive Visual Area with Low Commodity & High Wildfire

[1]Management Emphasis definitions:

1) Conservation — Emphasis provides for the protection of rare native elements and systems while maintaining proper functioning systems and testoring systems where there is low risk to rare elements or systems. Some human commodities may be produced but the emphasis is on human values related to protection of native diversity, aesthetics, and recreation.

2) Restoration — Emphasis provides for subsidizing ecological and landscape processes and functions to shift the transition toward proper functioning systems. Considerable human commodities may be produced that are compatible with restoration, as well as conservation of inclusions of rare elements and systems, but the emphasis is on shifting landscapes that are in high departure from the native regime toward proper functioning ecological relationships.

3) Production — Emphasis provides for production of human needs and values by managing in concert with native ecological and landscape processes to maintain or shift to proper functioning systems. This will typically require subsidies to represent native ecological cause-and-effect relationships at landscape levels, along with some restoration and conservation, but the emphasis is on design of system responses that produce commodities and other values.

4) Traditional — Emphasis on the independent management model for producing commodity values, protecting visually or environmentally sensitive areas, or managing reserves to protect semi-primitive characteristics.

[2]Prescribed natural fire program with planned ignition.

[3]Prescribed natural fire program with unplanned ignition.

[4]Traditional sensitive visual area management similar to traditional reserve.

Table 2.5 — General management activity levels[1] by prescription set (Rx).[2]

	Forest Management				Range Management								Prescription Type		
Rx	Harvest	Thin	Rx Fire	Road Density	Grazing Effects	Upland	Riparian	Wood-land	Rx Fire	Road Density	Wildfire Hazard	Exotics Hazard	Trad[3]	Ecol[3]	Allocation Method
H	N	N	N	N	L	N	N	N	N	N	H	N	NA	NA	NA
Ecological Prescriptions															
A1	N	N	H	N	L	N	N	N	M	N	L	L	NA	3-7	Multi-scale
A2	M	H	H	L-M	L	H	H	H	H	L	L	L	NA	3-7	Multi-scale
A3	H	H	H	L-M	L	M	M	H	M	L	L	L	NA	3-7	Multi-scale
N1	N	N	L	N	L	L	L	N	L	N	M	L	NA	3-7	Multi-scale
N4	L	L	L	L	L	L	L	M	L	L	M	M	NA	3-7	Multi-scale
Traditional Reserve Prescriptions															
C1	N	N	L	N	L	N	N	N	L	N	M	M	1-7	NA	Area
N6	N	N	L	N	L	L	N	N	L	N	M	L	1-7	NA	Area
P1	N	N	N	N	L	N	N	N	N	N	H	M	1-7	NA	Area
Traditional Commodity Prescriptions															
C2	H	M	L	M-H	M	M	M	M	M	M	M	H	1-7	NA	Area
C3	H	H	L	H-V	M	M	L	M	M	L	M	H	1-7	NA	Area
N3	H	H	L	M-V	M	L	L	M	L	L	H	H	1-7	NA	Area
N5	M	M	L	L-M	L	L	L	M	L	L	M	H	1-7	NA	Area
N8	H	H	L	M-V	L	L	L	M	L	L	M	H	1-7	NA	Area
P3	H	M	L	H-V	H	L	N	M	L	L	M	H	1-7	NA	Area
Traditional Commodity in Sensitive Areas															
N2	M	M	L	L-M	M	L	L	M	L	L	M	H	1-7	NA	Area
N7	M	M	L	L-M	L	L	L	M	L	L	M	M	1-7	NA	Area
P2	L	N	N	L	L	N	N	L	N	N	H	H	1-7	NA	Area

[1]Levels: L = low; M = moderate; H = high; V = very high; N = none.

[2]As simulated by Columbia River Basin Succession Model.

[3]Rx = prescription; Trad. = traditional prescription; Ecol. = ecological prescription.

Table 2.6 — Management prescriptions (Rx) sorted by conservation, restoration, and production emphasis.

Rx Emphasis	Rx Ability to Achieve Emphasis	Management of Forest Non-Wilderness/ Roaded	Management of Range Non-Wilderness/ Roaded	Wilderness/ Non-Roaded Management
		Prescription		
Conserve	High	N1	N1	
	Moderate	N4	N4, C1	N6[1]
	Low	P1	P1	C1, P1
Conserve - Produce	High	N2, N7	N4	C1
	Moderate	N4 > N5[2]	N1	N1
	Low	P2[1]		N6
Produce	High	P3 > C3> C2	C3	C1
	Moderate	N8, N3	N2, N3	N6
	Low	N7 > N5 > N4		
Restore	High	A1	A2	A1
	Moderate	A1	A3	N1
	Low	N4	N1	
Restore - Conserve	High	A1	A2	A2
	Moderate	N1	N1	N1
	Low	N4	N4	
Restore - Produce	High	A3	A3	A1
	Moderate	A2	A2	N1
	Low	N2 > N4 > N5	N1	

[1]Model not commonly used in simulations.

[2] > = greater than; Rx has a greater emphasis than the next Rx.

The general characteristics of the 17 management prescriptions are described in tables 2.5 and 2.6. General responses of all 18 prescriptions are documented by Hann and others (in press) and Long and others (1996). Documentation of the detailed model probability and associated response data is provided in the landscape assessment data record (Hann and others 1997). Levels of disturbance were identified by management prescription type in relation to management emphasis: conserve, restore, restore-produce, conserve-produce, restore-conserve, or produce (table 2.6). These categories correspond with emphasis categories in the alternatives of the preliminary draft EISs.

Also identified for simulation purposes were relative rankings of fine-scale attributes associated with the prescription (table 2.7). These attributes had substantial fine- and mid-scale differences within a broad-scale disturbance or vegetation type. In the assessment of current and historical conditions, for example, there were substantial differences within a given broad-scale type in:

- Composition and structure of such components as vegetation species and density; snags; down wood; and bare soil.
- Disturbances, such as: fire behavior, grazing effects, insect/disease mortality; and their patterns including patch size and shape, and position relative to biophysical relationships.

In general, these differences were correlated with:

- Roaded areas disturbed by management activities.
- Roadless areas substantially affected by fire exclusion.

Table 2.7 — General attribute response to emphasis of management prescriptions in forest for dead standing/down material conservation and soil exposed to erosion.

Rx[1]	Large Snag Conservation	Large Down Wood Conservation	Duff/Litter Cover	Bare Soil
N4	Moderate	Moderate	Moderate	Low
N5	Moderate	Moderate	Moderate	Moderate
N6	High	High	High	Low
N7	Low	Low	Moderate	Moderate
N8	None	None	Low	High
A2	High	High	High	Low
C2	Low	Low	Moderate	High
N2	Low	Low	Moderate	Moderate
P2	Low	Low	High	Low
A3	Moderate	Moderate	High	Low
C3	None	None	Low	High
N3	None	None	Low	High
P3	None	None	Low	High
A1	High	High	High	Low
C1	High	High	High	Low
N1	High	High	High	Low
P1	Low (lost to wildfire)	Low (lost to wildfire)	Low (lost to wildfire)	High (exposed to wildfire)

[1]Rx = prescription.

• Roadless areas with minimal or no effect by fire exclusion.

We used the response differences between management prescriptions to characterize disturbance probabilities and associated response. Our interpretations of the broad-, mid-, and fine-scale data were done, either quantitatively or qualitatively, based on our hierarchical knowledge of the broad-scale patterns of vegetation and disturbance type and its associated composition, structure, or landscape patterns at mid- and fine-scales.

Alternative Emphasis and Prescription Assignments

Management classes represented areas of different ownership and management emphasis within an EIS area. The BLM- and FS-administered lands included the following five management classes:

• Roadless, natural process dominated areas (wilderness and wilderness-like).

• Roadless, human/natural process dominated areas (typically visually sensitive or semi-primitive areas).

• Roadless, human process dominated areas (typically roadless areas managed for commodities or dispersed recreation or visuals).

• Roaded, human/natural process dominated areas.

• Roaded human process dominated areas.

Spatial and temporal prescription assignments differed by alternative, with prescriptions assigned systematically to stratifications by:

• Subbasin [4th-field hydrologic unit code (HUC)]

• EIS area

• Management class

• Potential Vegetation Group.

To develop an integrated map of management prescriptions for each alternative, we developed a

data file stratified to the subbasin, EIS area, management class, and potential vegetation group that had management emphasis codes from the preliminary draft EISs for forest and range by alternative. We then used the information from the preliminary draft EIS on alternative activity levels, theme, DFCs, and standards to correlate with the "best fit" or management prescription model.

Prescriptions were assigned a management emphasis based on the following factors, in successive order:

- Emphasis maps (preliminary draft EISs, Ch. 3)
- Activity level descriptions
- Desired future conditions (DFCs)
- Theme of the alternative
- Standards of the alternative.

Using this data, we developed a rule set to assign a management prescription code for each map stratification (table 2.6). The rule set was applied and then adjusted for "best fit" based on:

- Our assumptions for the alternatives, as discussed in the "Introduction" section of this chapter.
- Management emphasis and activity levels from the preliminary draft EIS, Chapter 3.
- Themes and desired future conditions of the alternatives.
- Standards from Chapter 3 of the preliminary draft EIS.
- An iterative process for assigning prescriptions and summarizing estimated effects levels to achieve the standards (see appendix I, Vol. II of this document).
- Qualitative review of Chapter 3 of the preliminary draft EISs to check for logical mapping of prescription codes.
- Knowledge of ecological integrity, socioeconomic resiliency, forest and range clusters, and the desired response as written in the preliminary draft EIS, Chapter 3 (see appendix I).
- Correction of errors in management class with the appropriate prescriptions.

Management emphasis maps for forest and range were based on the integrity clusters and preliminary draft EISs. Management emphases are shown on maps 2.1 through 2.14. Descriptions of each kind of management emphasis are provided in appendix 2-C. The prescription assignments for each alternative are shown on maps 2.15 through 2.21. Tables 2B.1 through 2B.28 in appendix 2-B summarize prescription model characteristics for forest and range areas for each EIS area by alternative, based on the prescription assignment and other appropriate information.

Preliminary Draft EIS Alternative Disturbances and Simulated Disturbances

The simulation of alternatives had three objectives for evaluating vegetation and disturbance response at the broad-scale assessment level:

Objective 1. Prescription maps and associated simulation data were adequate to determine the relative differences in trends among the responses for different landscape variables of Alternatives 1 through 7.

Objective 2. Understand the dynamics and variability of the responses of each alternative, based on their ability to be successfully implemented. For this objective, it was important that the simulation would quantify the dynamic cause and effect relationships of management activities, alternative standards, disturbances, and landscape variables through time.

Objective 3. Quantify general levels of differences among activity levels and other disturbances for comparison purposes. For this objective, it was also important to generally quantify any differ-

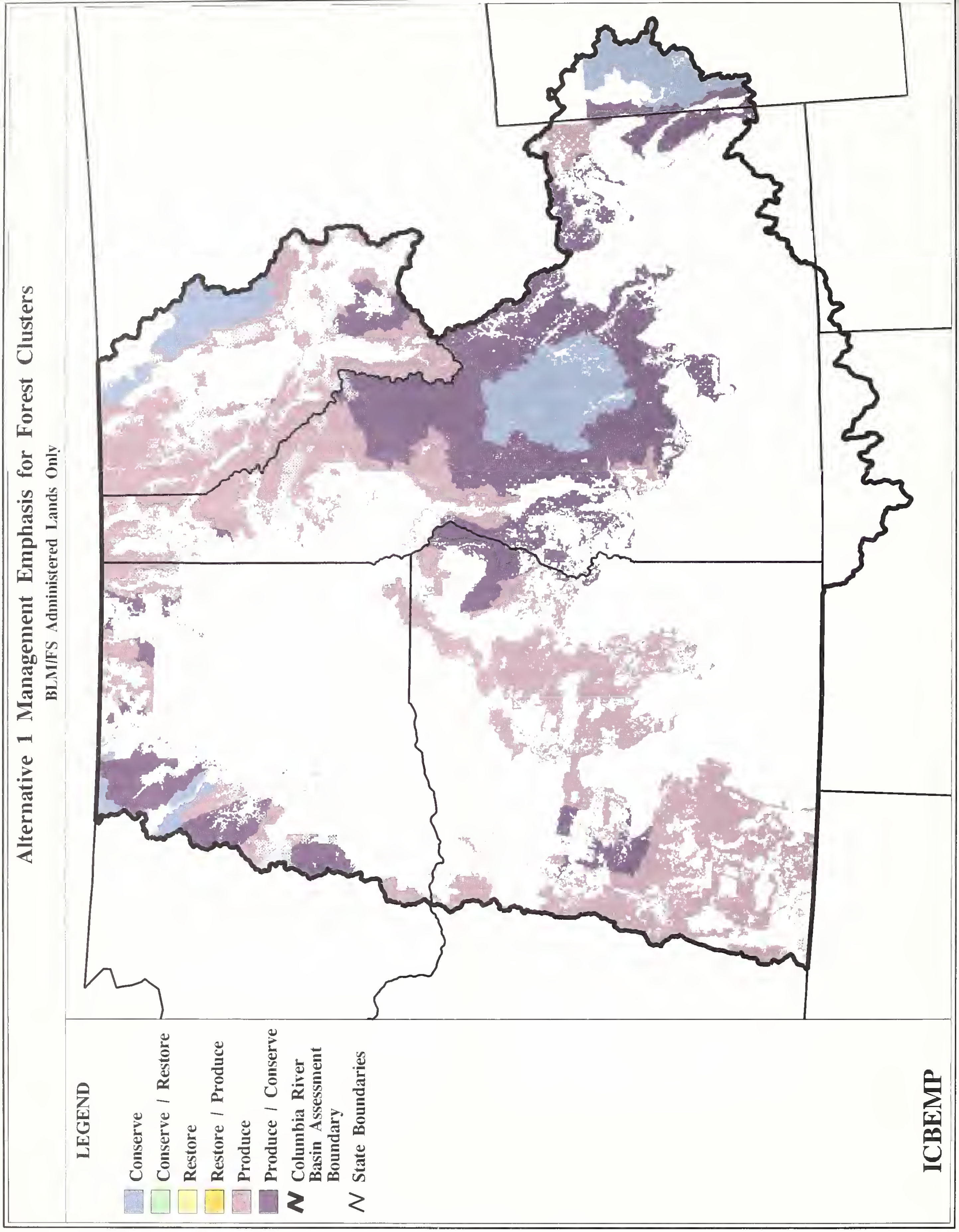
ences in the management activities specified in Chapter 3 of the preliminary draft EISs and compare them to the simulated levels. This provided a base for assessing if differences were related to actual spatial and disturbance factors or if the prescription map was in error.

The simulations of alternatives met Objective 1. Figures 2.3 through 2.6 provide comparisons of the simulated responses during the first decade to the preliminary draft EISs' minimum and maximum levels of activities. Tables 2.8 and 2.9 show values of forest and range activities. Additional information on the simulated responses is included in other sections of this evaluation.

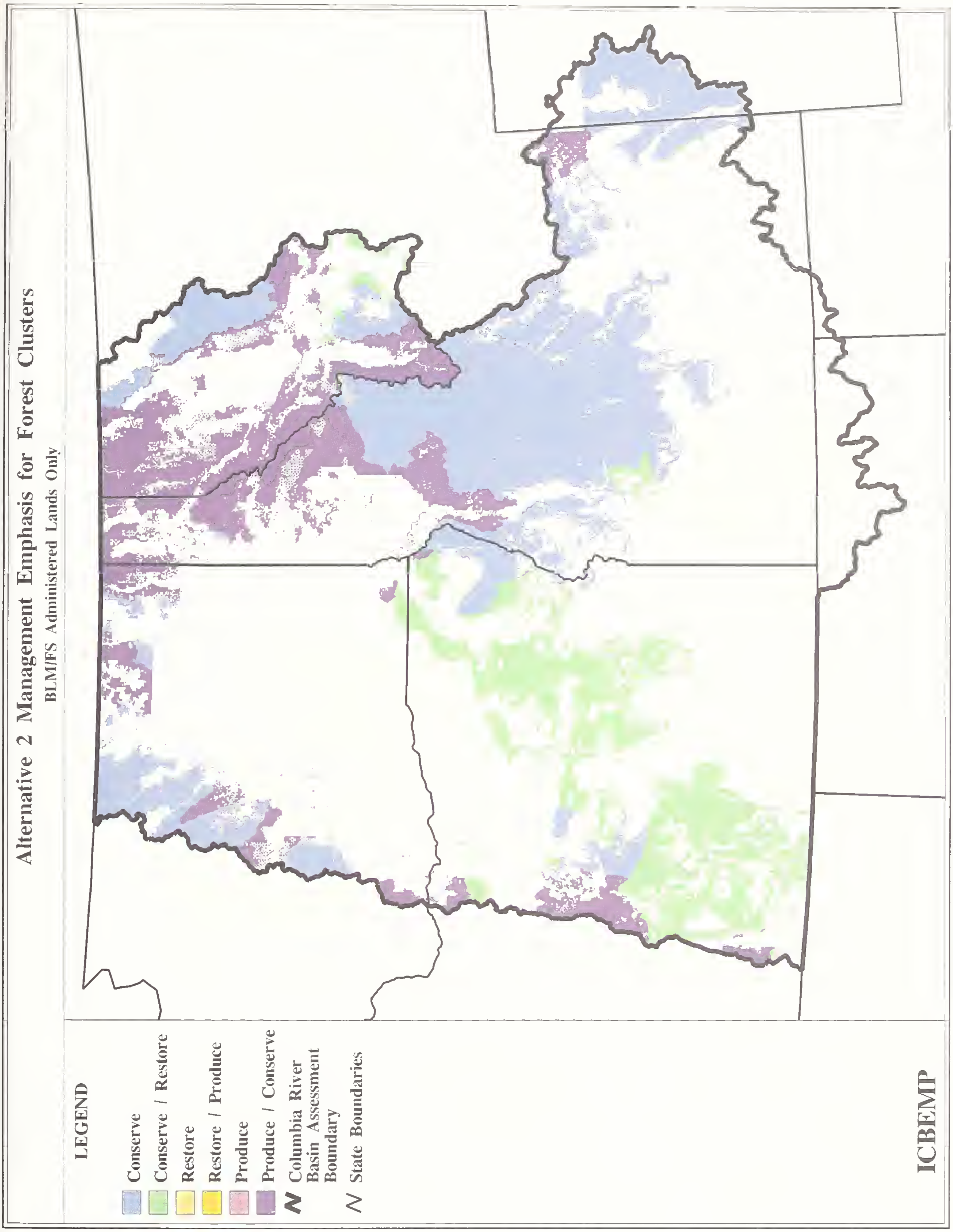
The second objective was met to a moderate degree with Alternatives 3 through 6, but only partially met with Alternatives 1, 2, and 7. The themes, desired future conditions, and standards of Alternatives 3 through 6 provided a base for predicting landscape dynamics in response to management. Alternatives 1 and 2, which emphasize traditional management, were difficult to model into the future with predictability because treatment assumptions were not consistent with the inherent disturbance processes and limitations of the biophysical template. This difficulty led to a response that has relatively poor reliability. Alternative 7 also presented modeling difficulty due to its large and frequently narrow reserves, and an associated unpredictability of wildfire. This response is indicative of the poor predictability and resiliency of systems managed with traditional commodity or reserve patterns, as compared to ecologically based management (Hann and others, in press).

Some discussion points relative to Objective 3 are listed below:

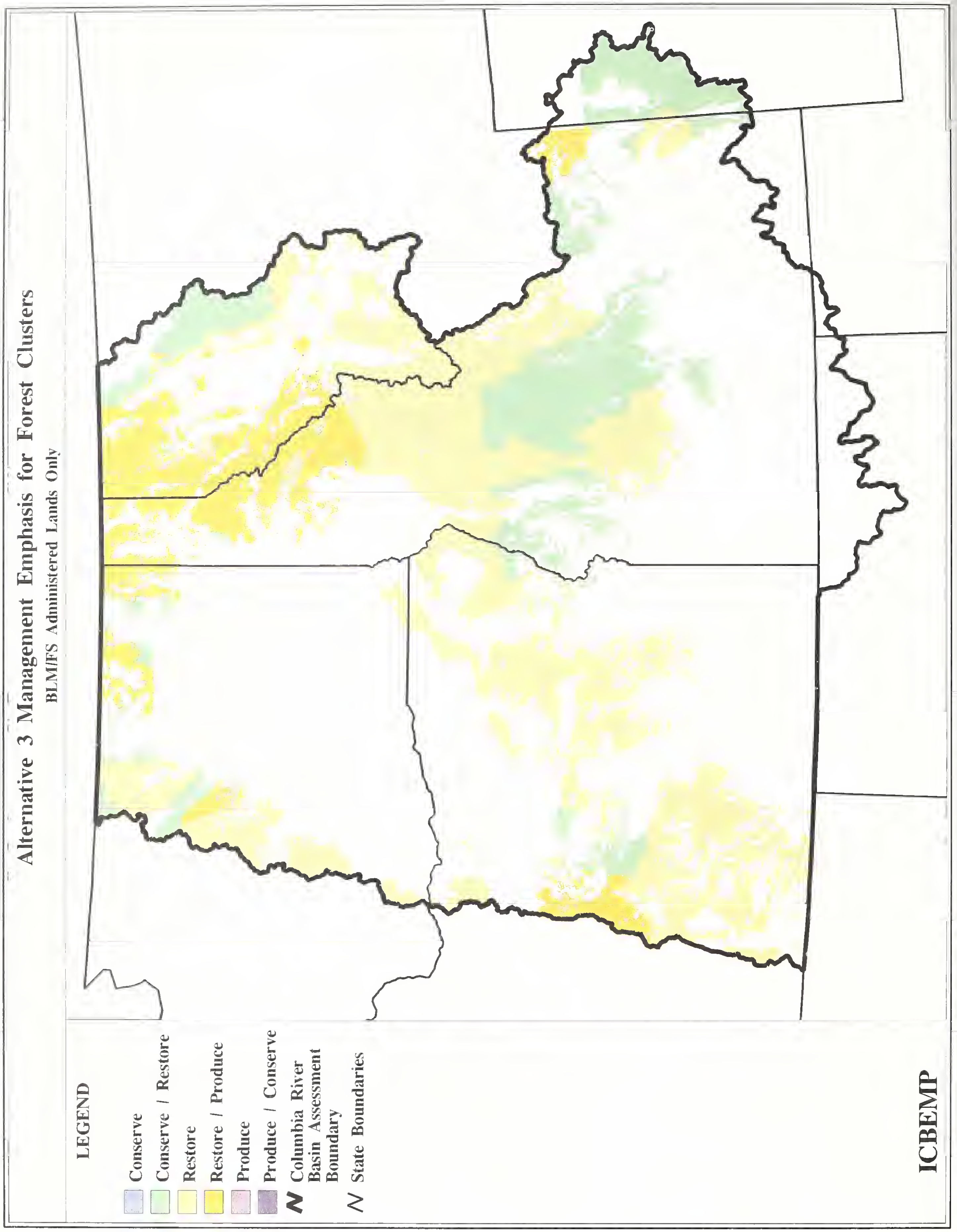
- For both EIS areas, the simulated levels of harvest in forests were relatively close to the preliminary draft EIS levels. Alternative 2 was slightly high, but the difference was not substantial for this spatial and temporal scale. However, because of the transition time necessary to change from from traditional management to ecological management in Alternatives 3 through 7 we are not highly confident that the harvest levels can be implemented.
- For both EIS areas, the simulated thinning levels in forests were generally low compared to the preliminary draft EIS levels. In contrast, the prescribed fire levels in forests were high for both EIS areas. Given that simulated thinning also assumed some prescribed fire or treatment of fuels, and that prescribed fire assumed some pretreatment thinning, these two activities could be grouped or interchanged to some degree. The prescribed fire levels were high because the simulated levels included prescribed natural fire in wilderness and roadless areas, that was not quantified in the prescribed fire levels in the preliminary draft EISs.
- The simulated prescribed fire in rangeland was generally low in Alternatives 1 and 2, and high in Alternatives 3 through 7. These differences did not affect our ability to evaluate Objective 1, but did affect our ability to evaluate Objective 3. We discuss these differences qualitatively.
- The level of simulated rangeland improvements was low compared to the levels in the preliminary draft EIS, which included more than just vegetation improvements. When we included an estimate of other range improvements to improve livestock distribution, the level was comparable.
- The preliminary draft EIS used "livestock management acres" as a measure of implementation by permittees. We used a comparable estimate of range plan revision and implementation levels that combined the responsibilities of both the Bureau of Land Management and the Forest Service for rangeland plan revision within the context of the alternatives and associated implementation of grazing operating plans by permittees.



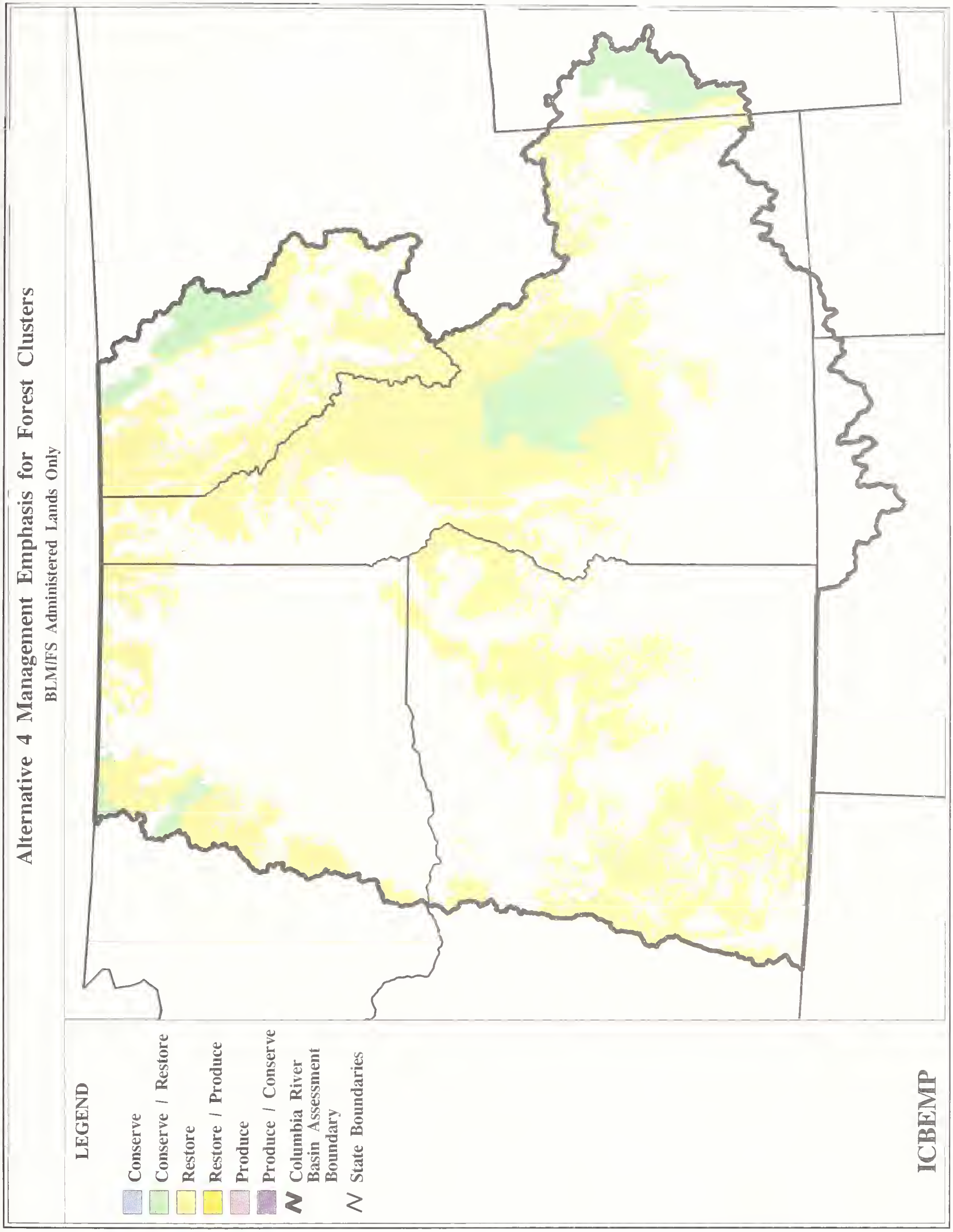
Map 2.1 – Alternative 1 management emphasis for forest clusters on BLM- and FS-administered lands only.



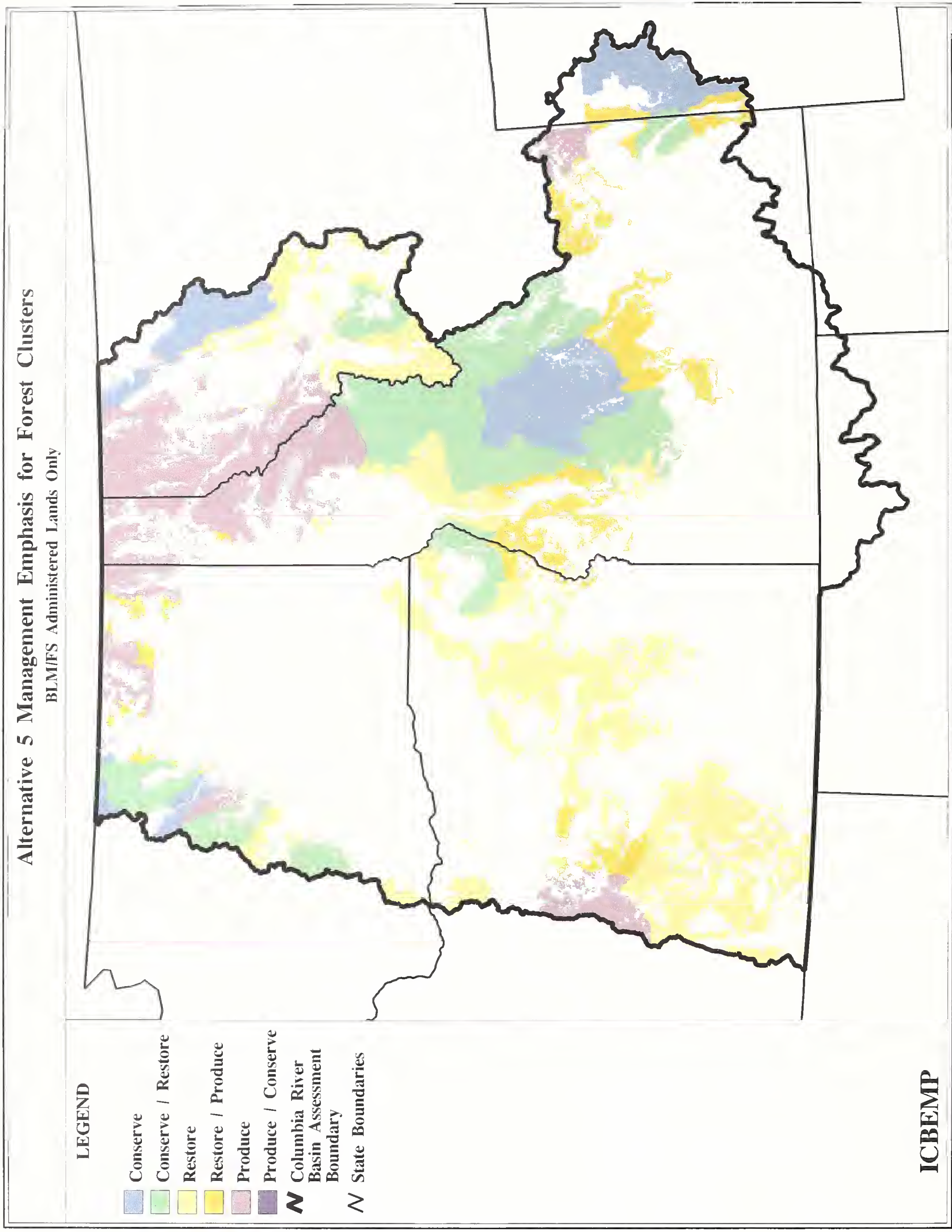
Map 2.2 – Alternative 2 management emphasis for forest clusters on BLM- and FS-administered lands only.



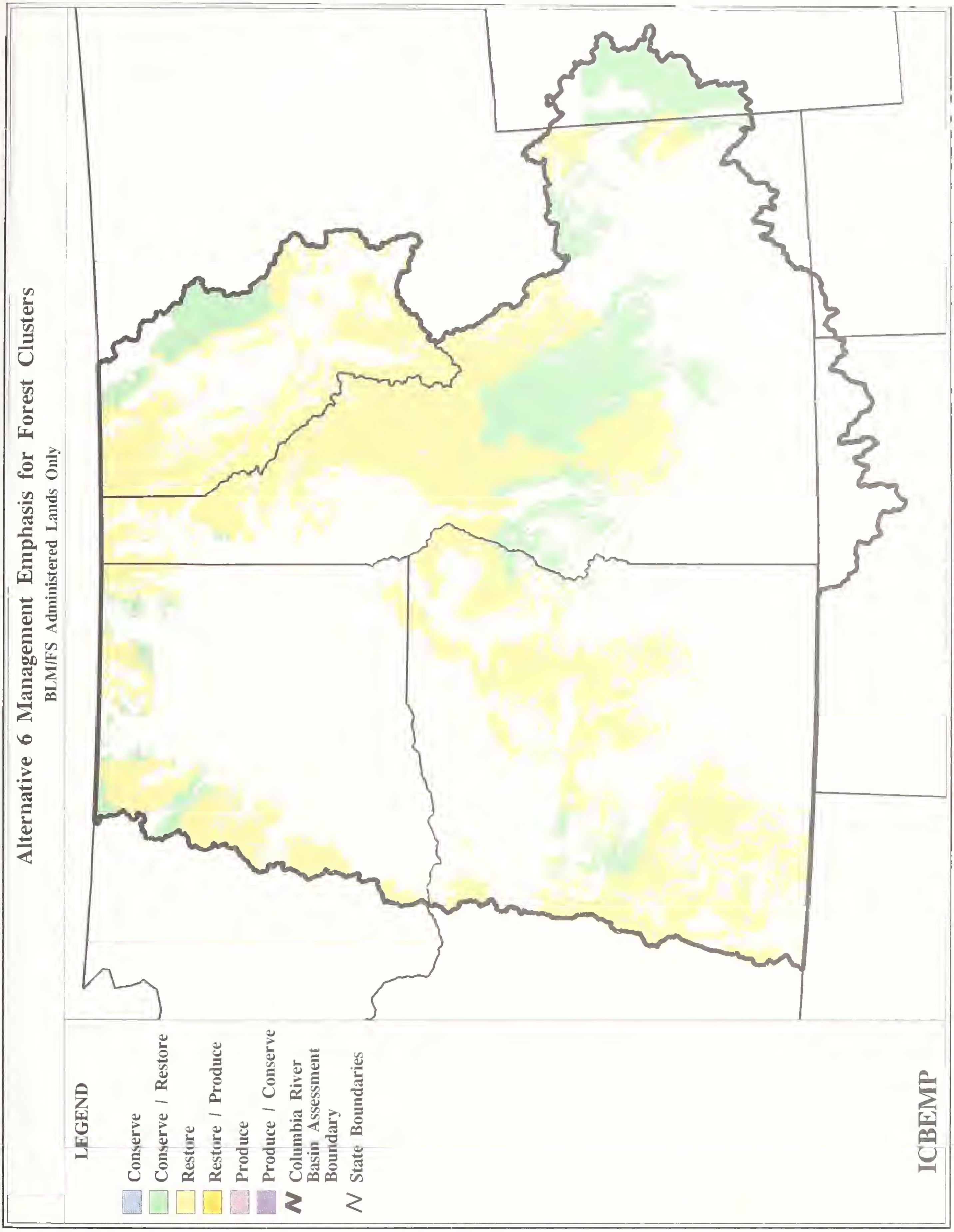
Map 2.3 – Alternative 3 management emphasis for forest clusters on BLM- and FS-administered lands only.



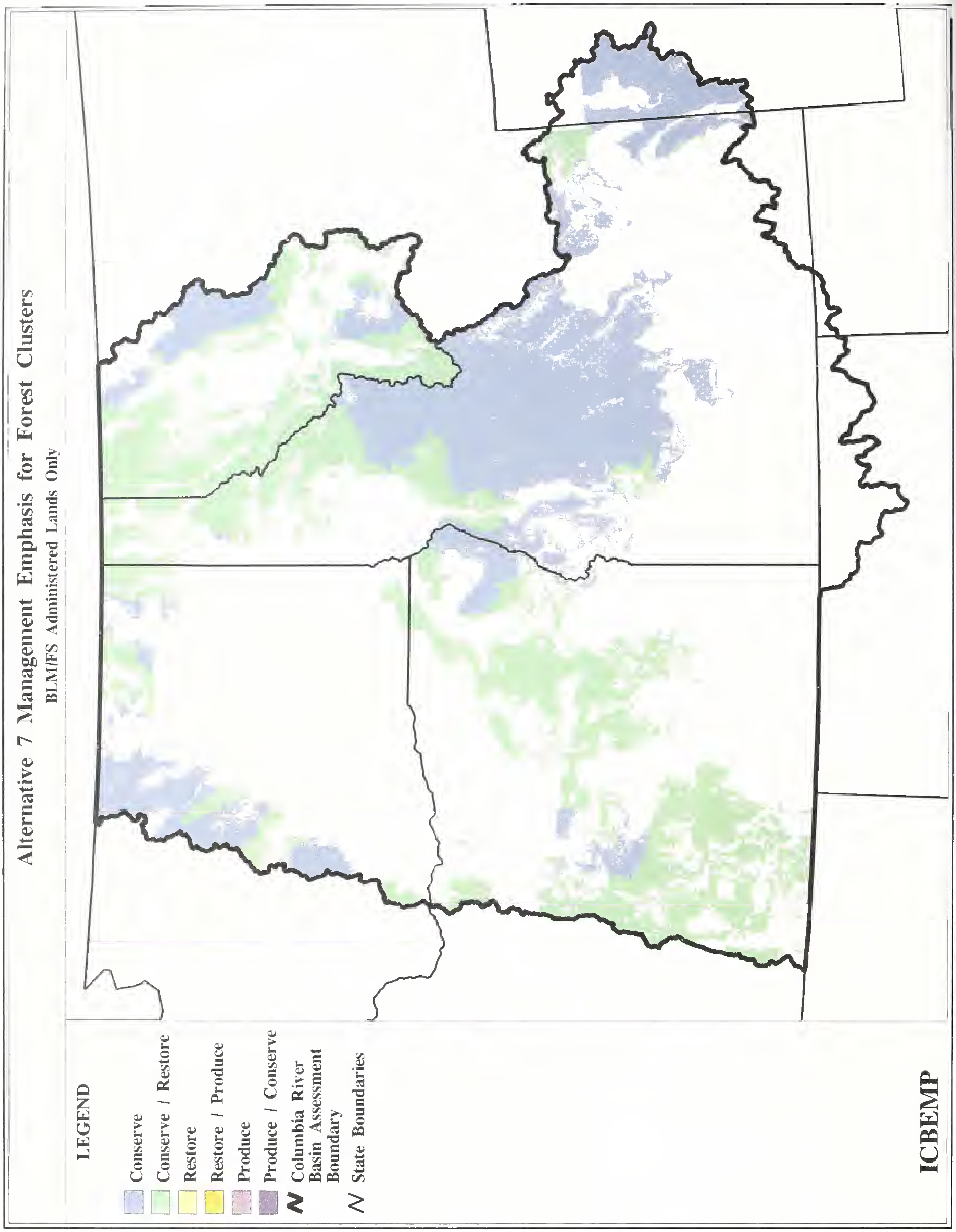
Map 2.4 – Alternative 4 management emphasis for forest clusters on BLM- and FS-administered lands only.



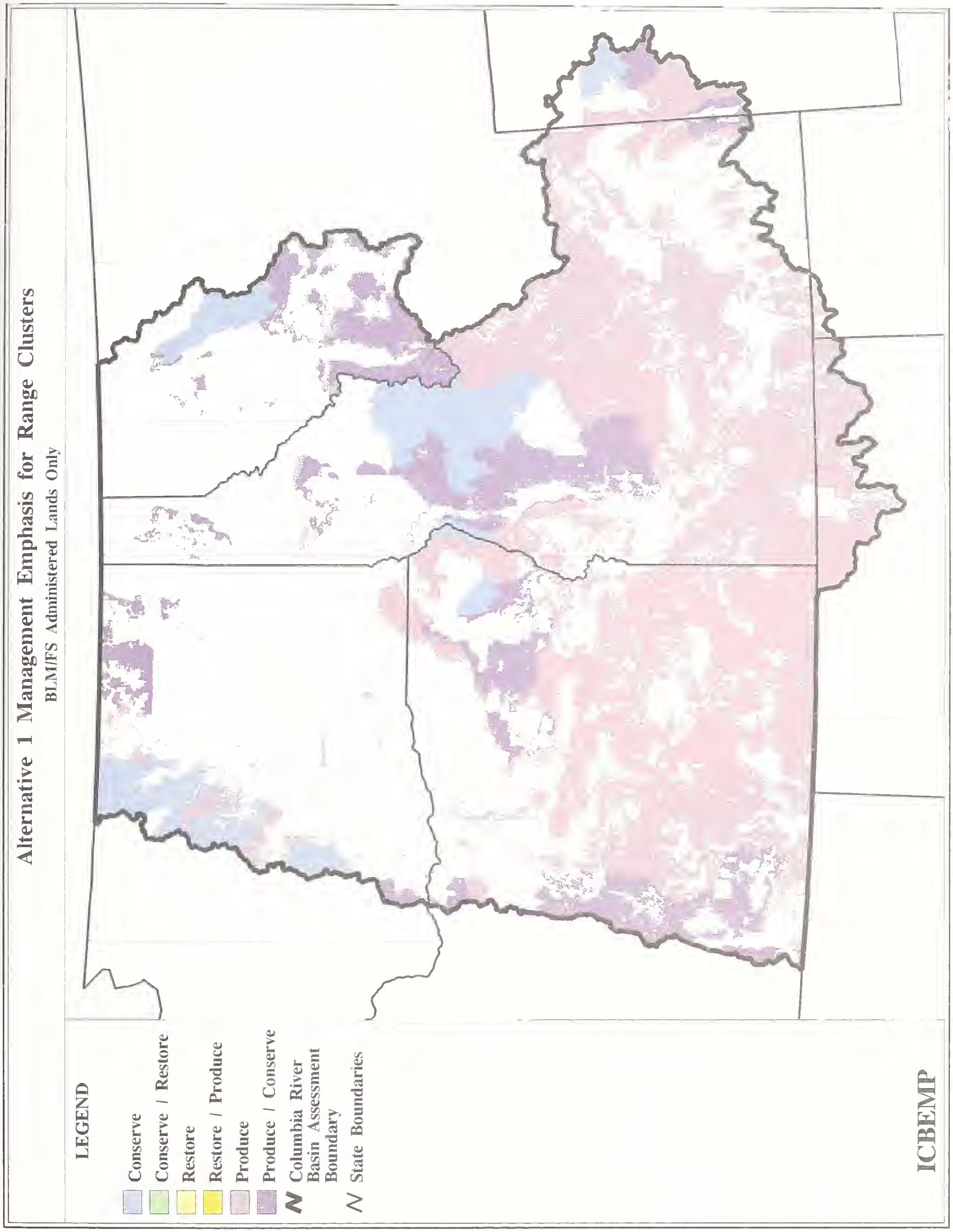
Map 2.5 – Alternative 5 management emphasis for forest clusters on BLM- and FS-administered lands only.



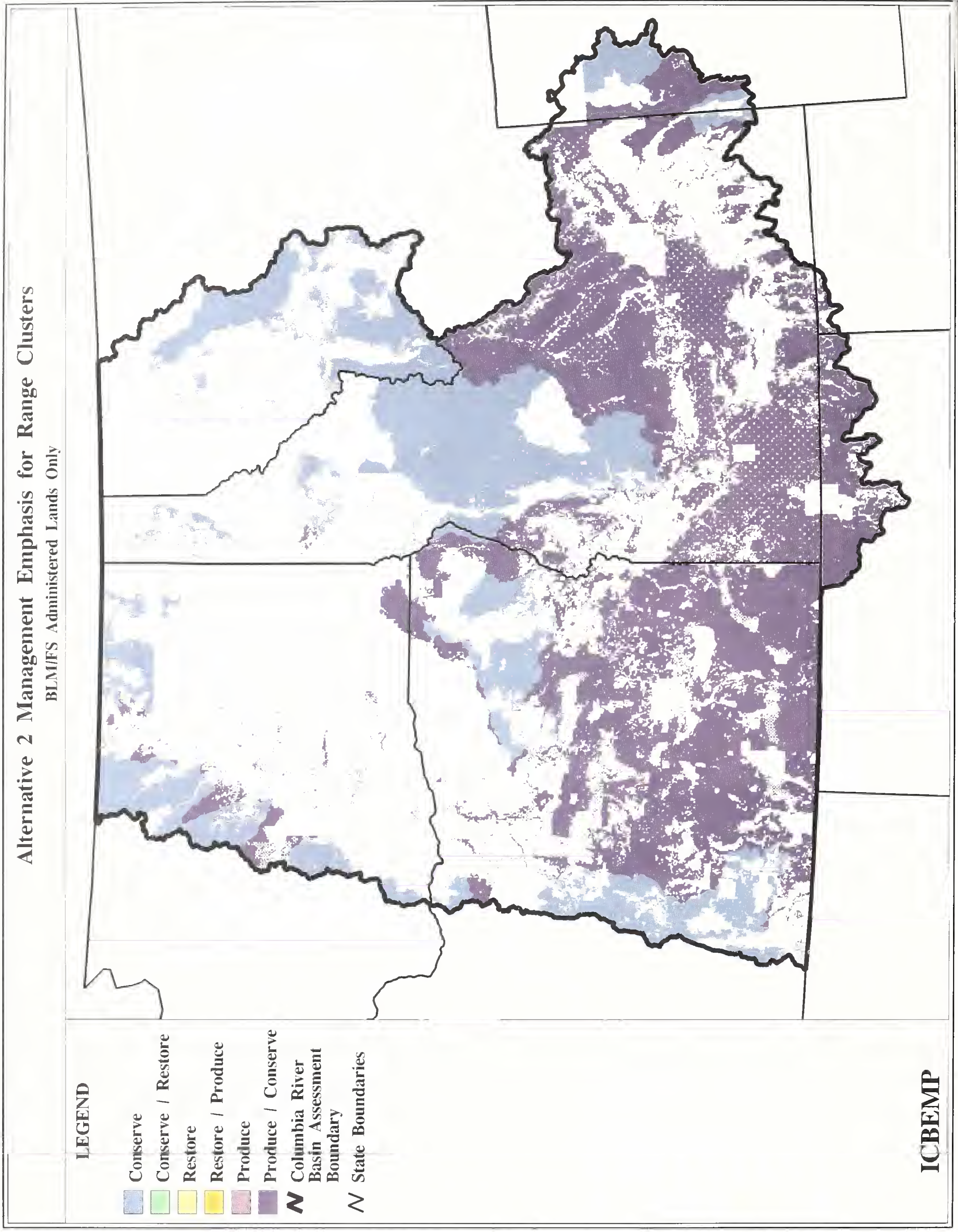
Map 2.6 – Alternative 6 management emphasis for forest clusters on BLM- and FS-administered lands only.



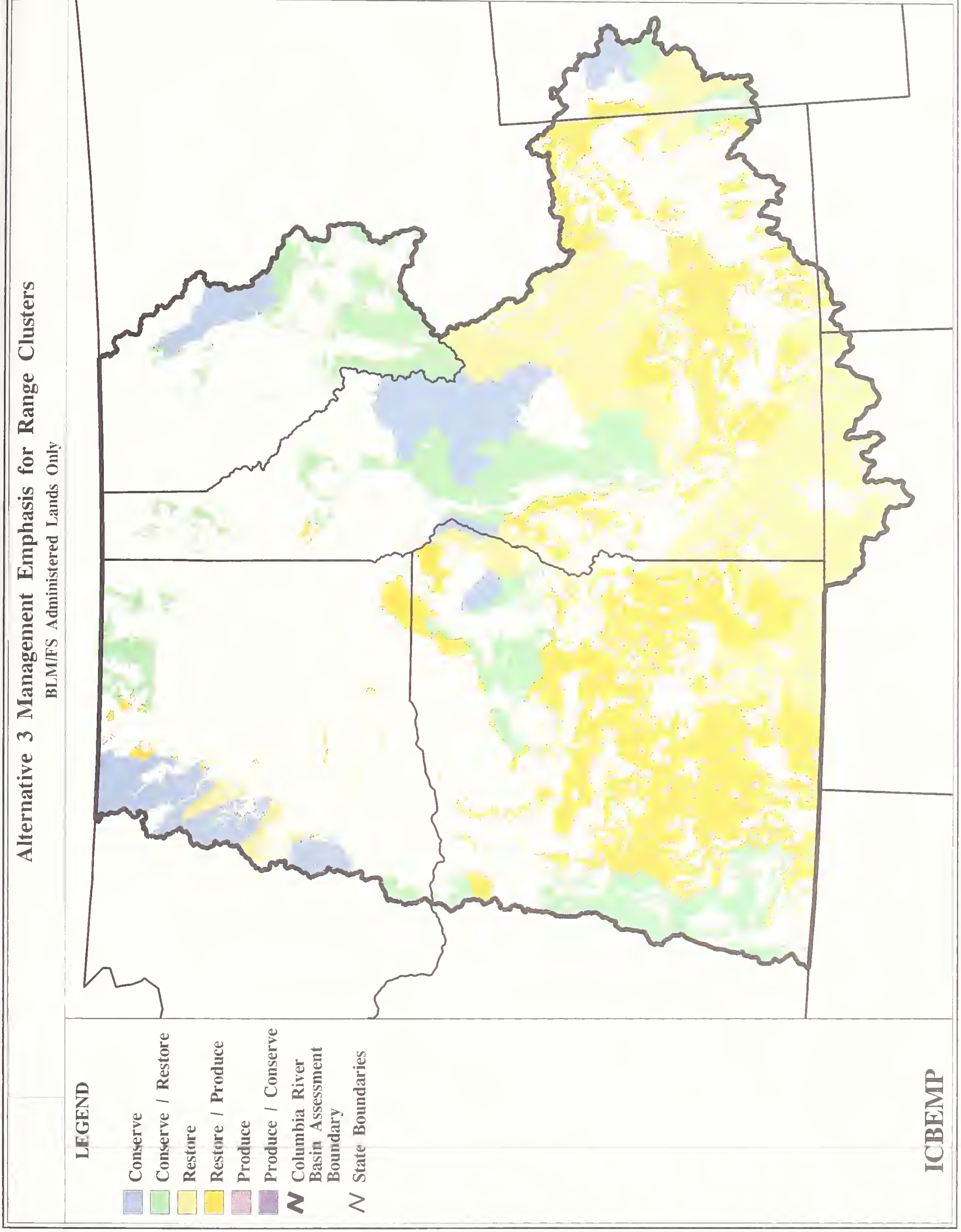
Map 2.7 – Alternative 7 management emphasis for forest clusters on BLM- and FS-administered lands only.



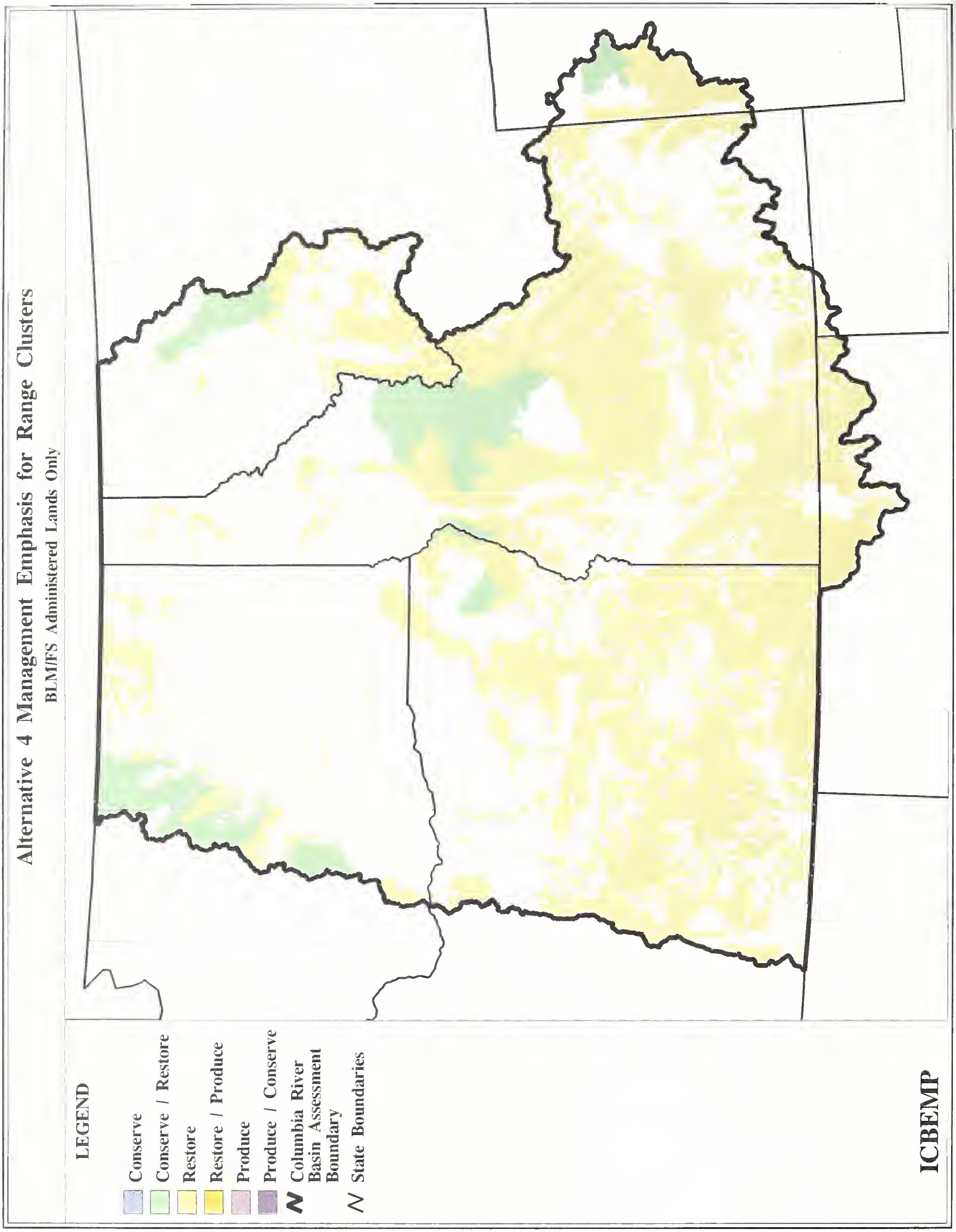
Map 2.8 – Alternative 1 management emphasis for range clusters on BLM- and FS-administered lands only.



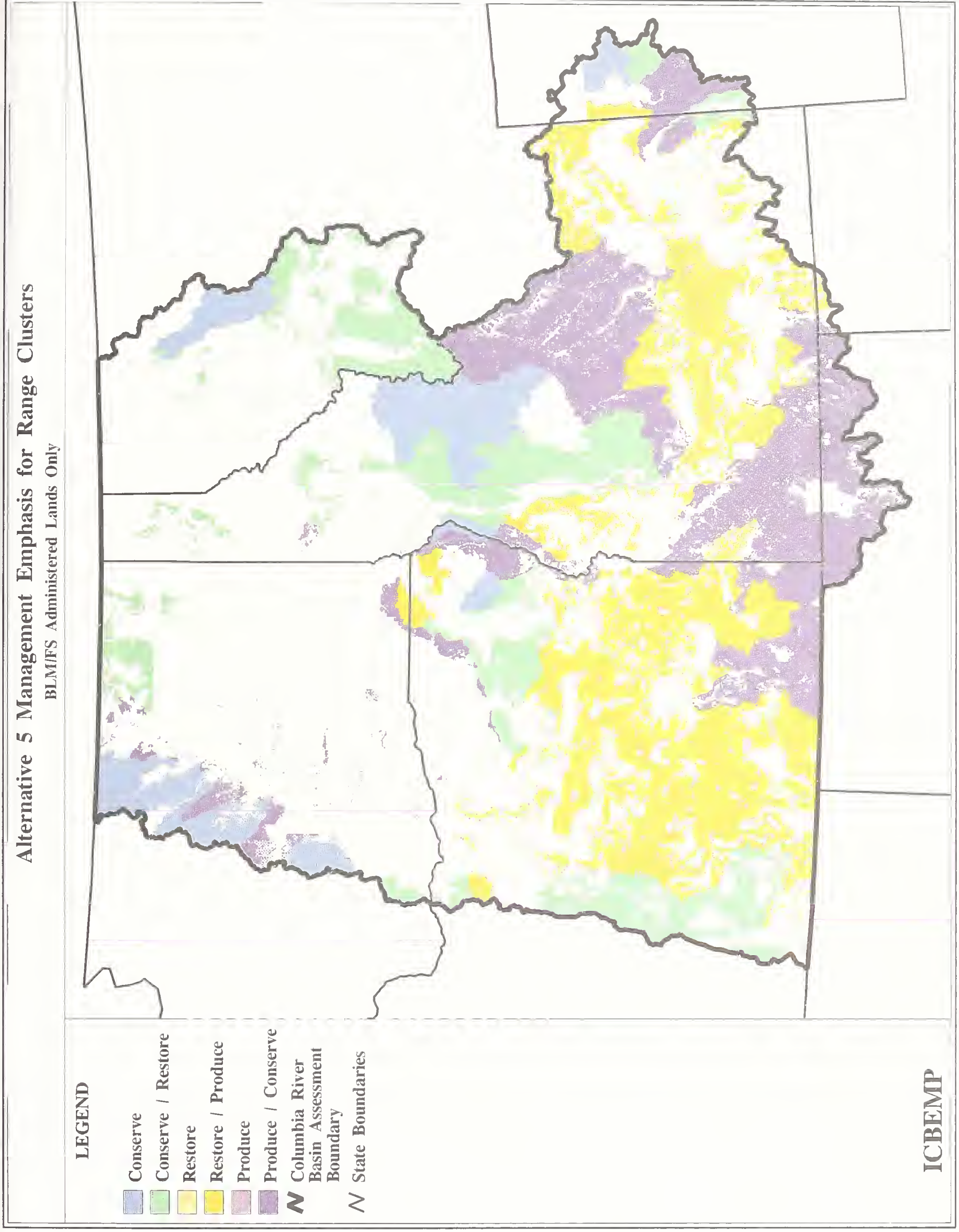
Map 2.9 – Alternative 2 management emphasis for range clusters on BLM- and FS-administered lands only.



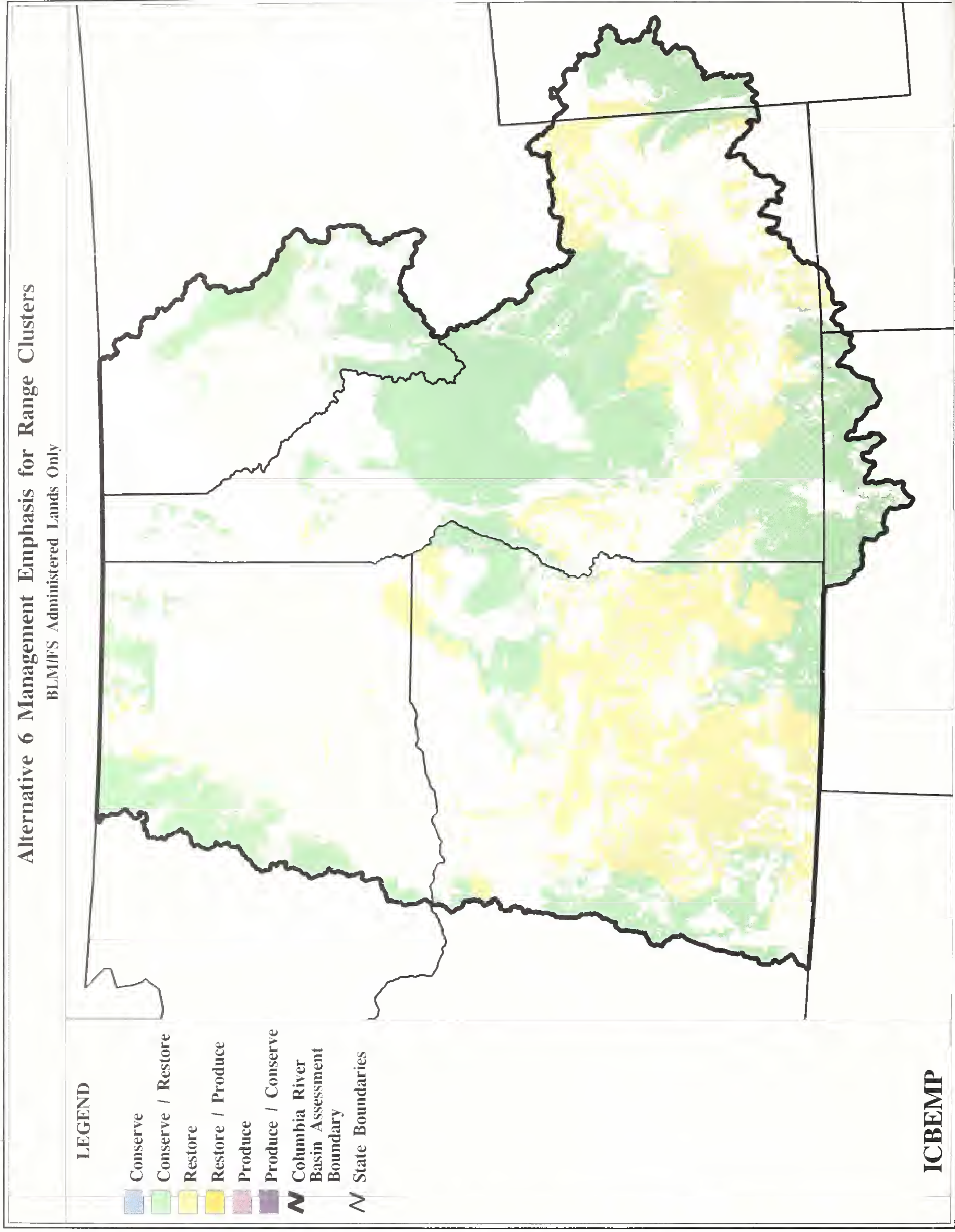
Map 2.10 – Alternative 3 management emphasis for range clusters on BLM- and FS-administered lands only.



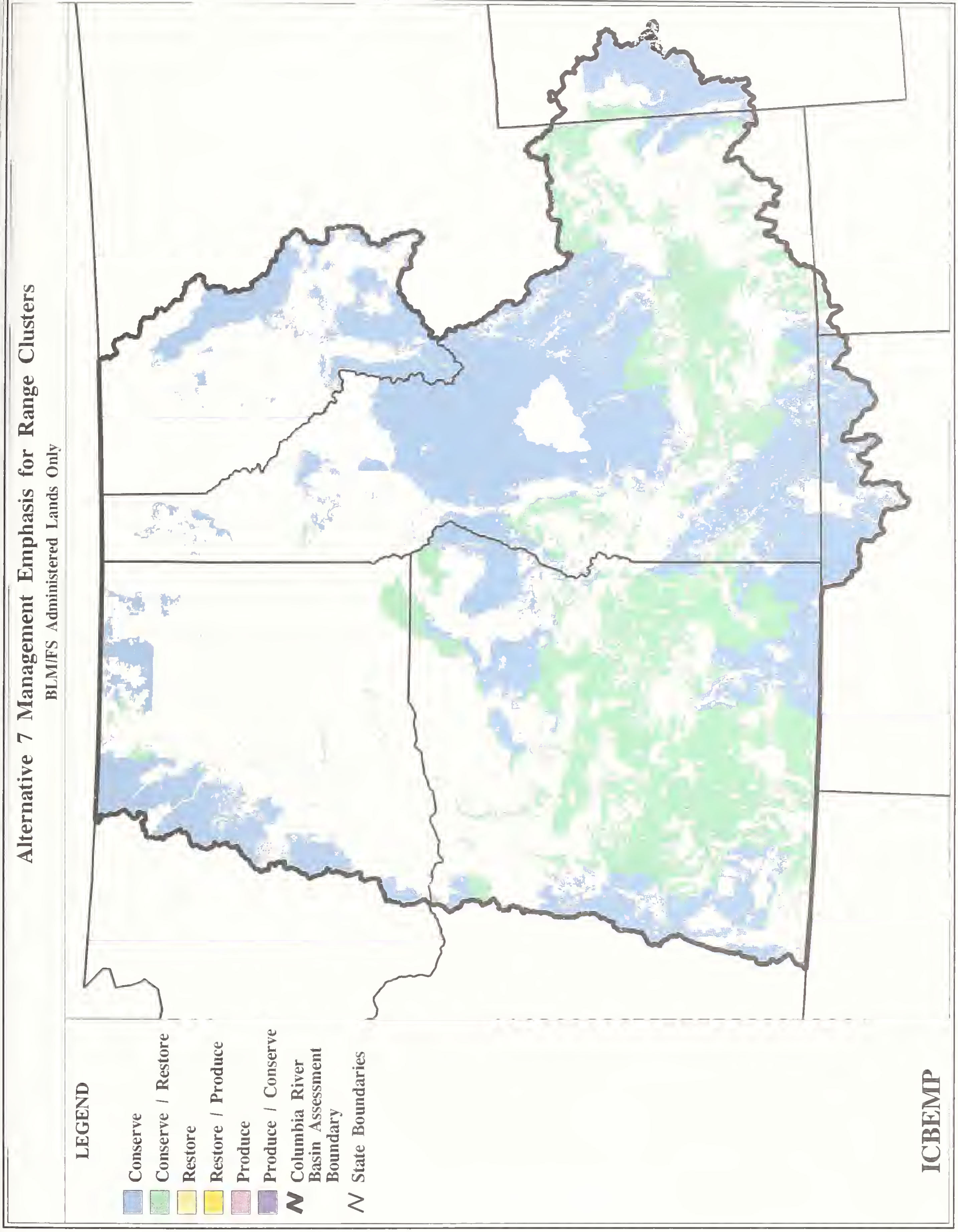
Map 2.11 – Alternative 4 management emphasis for range clusters on BLM- and FS-administered lands only.



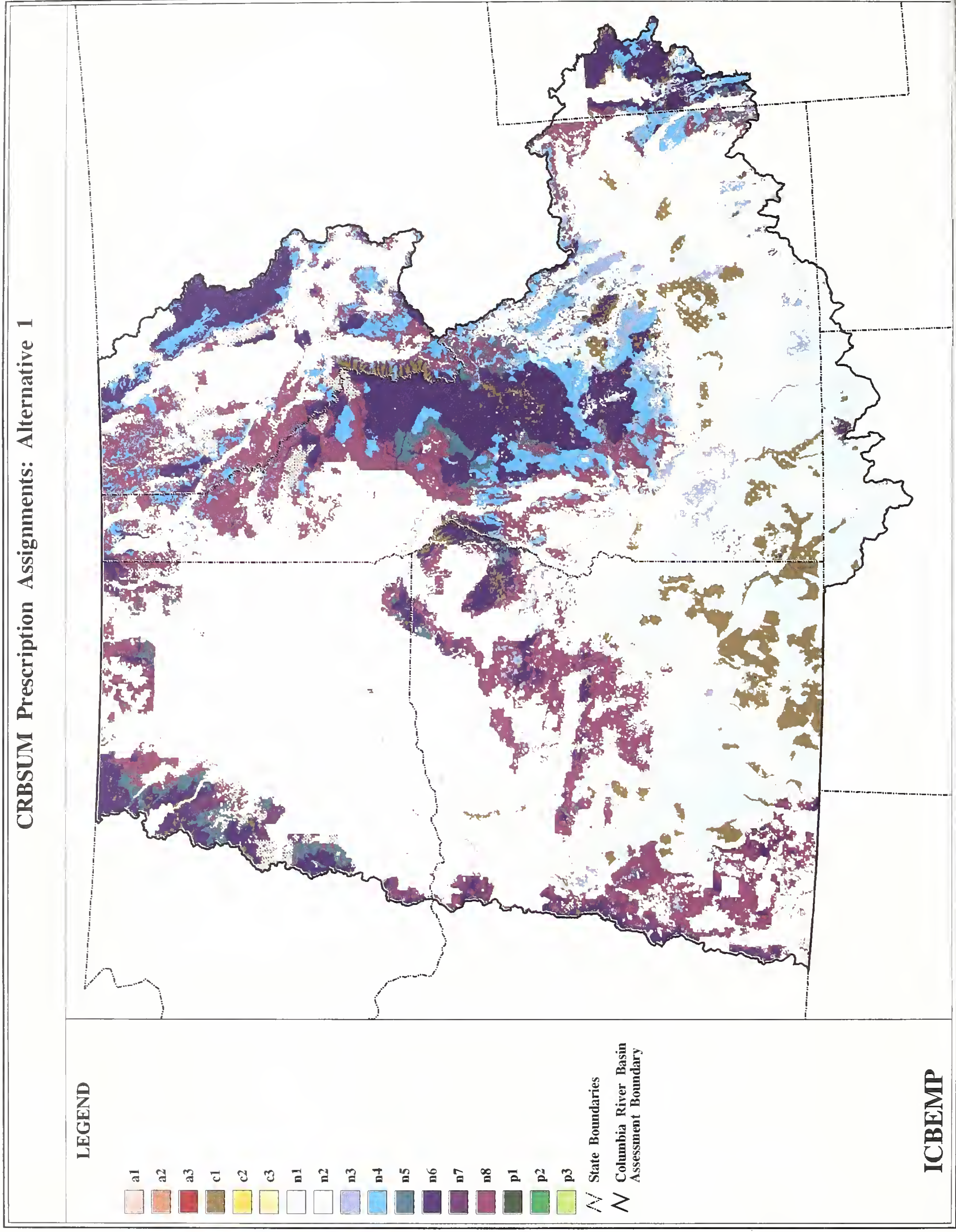
Map 2.12 – Alternative 5 management emphasis for range clusters on BLM- and FS-administered lands only.



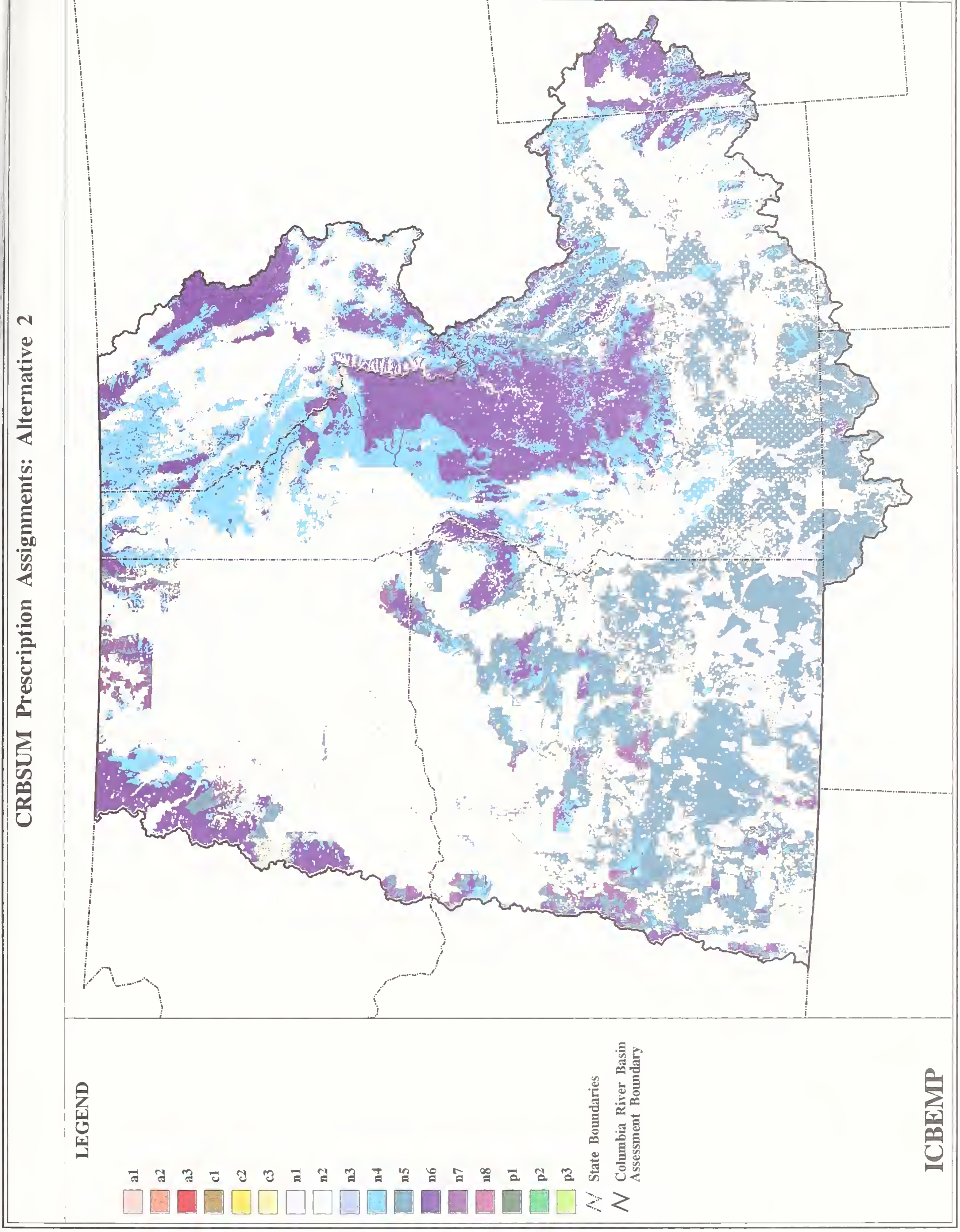
Map 2.13 – Alternative 6 management emphasis for range clusters on BLM- and FS-administered lands only.



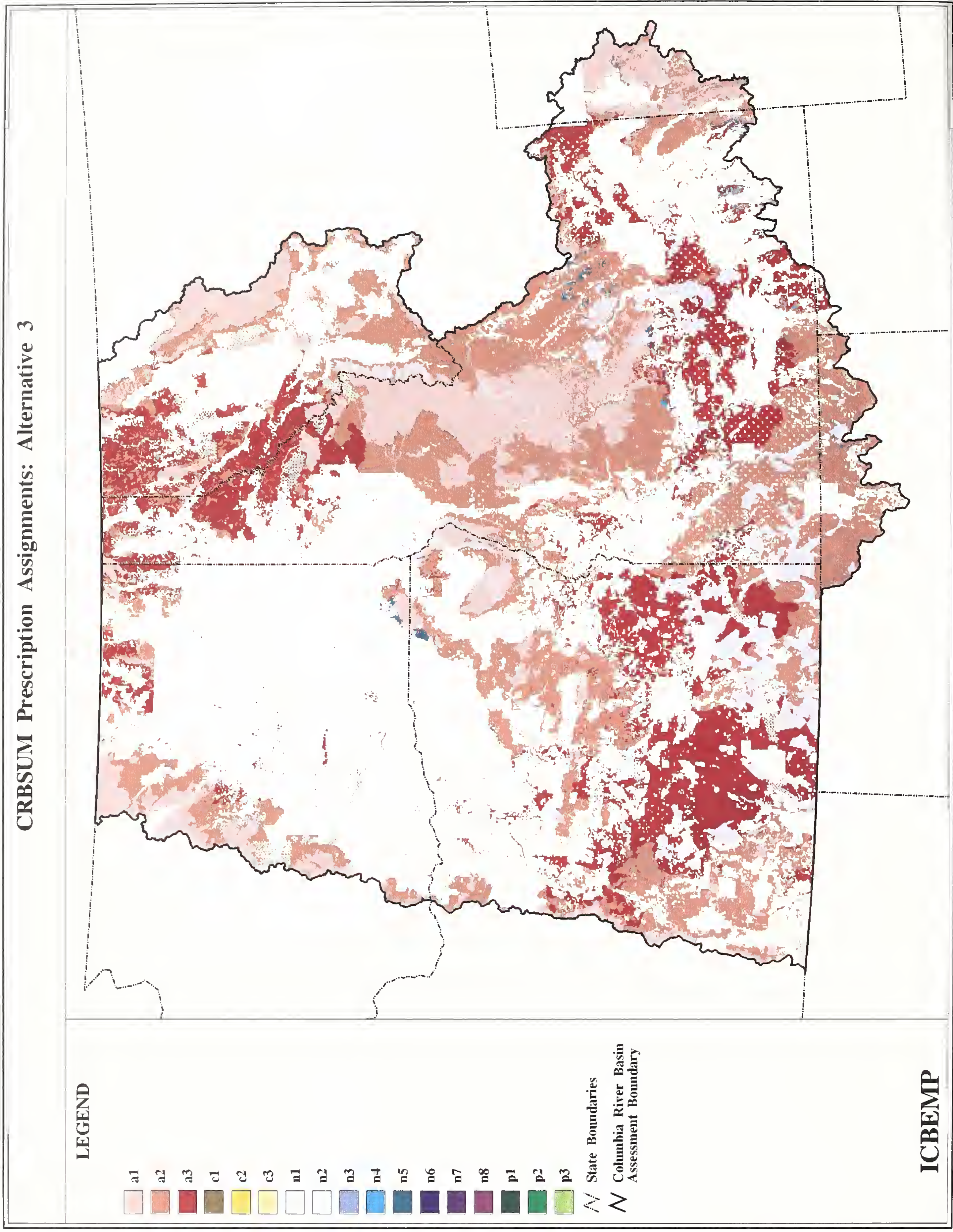
Map 2.14 – Alternative 7 management emphasis for range clusters on BLM- and FS-administered lands only.



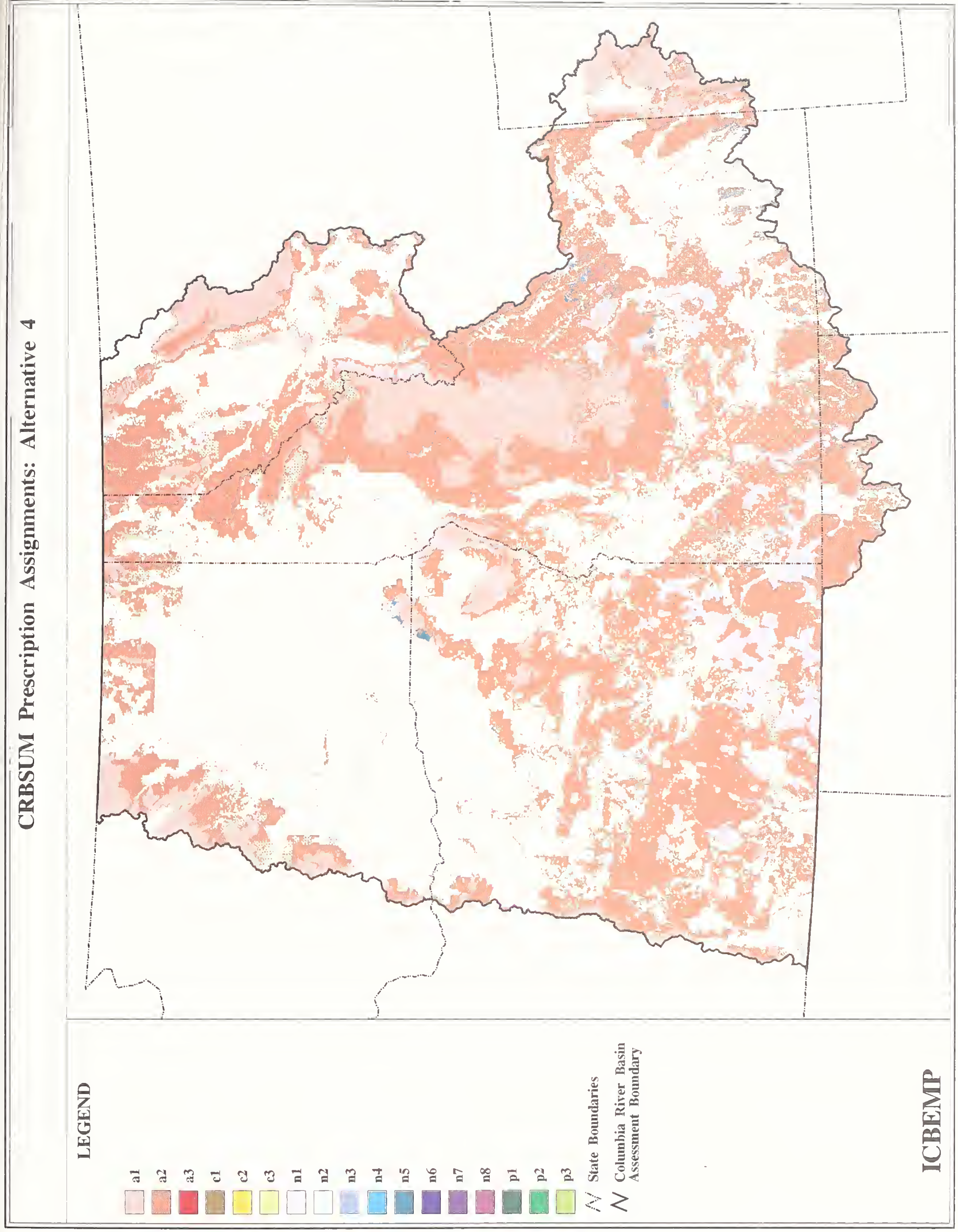
Map 2.15 – Alternative 1 management prescription (Rx) assignments for forest, rangeland, and other potential vegetation groups. Management prescriptions indicate level of management and restoration activities with probability of disturbance events for wilderness and non-wilderness roaded and roadless land management classes.



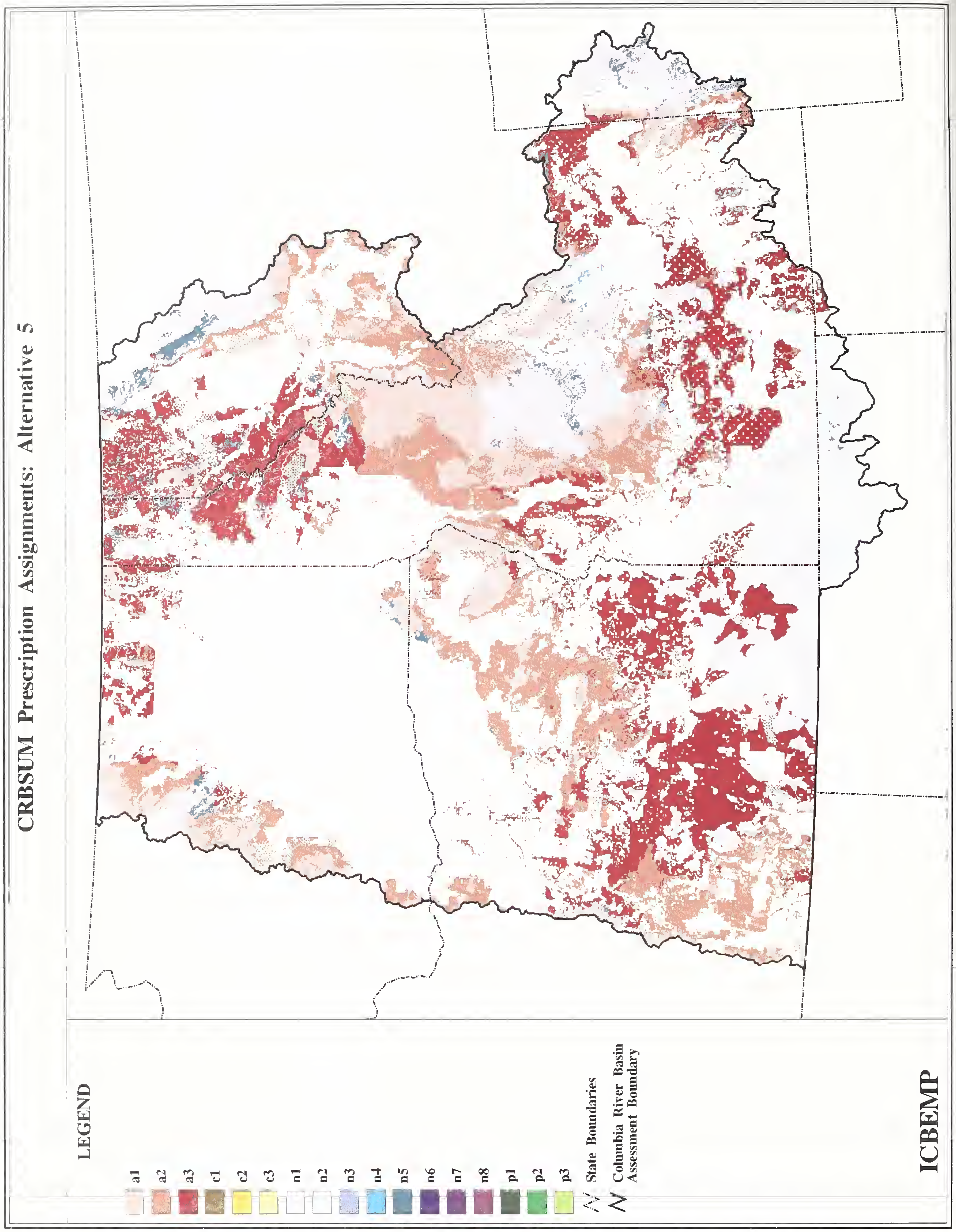
Map 2.16 – Alternative 2 management prescription (Rx) assignments for forest, rangeland, and other potential vegetation groups. Management prescriptions indicate level of management and restoration activities with probability of disturbance events for wilderness and non-wilderness roaded and roadless land management classes.



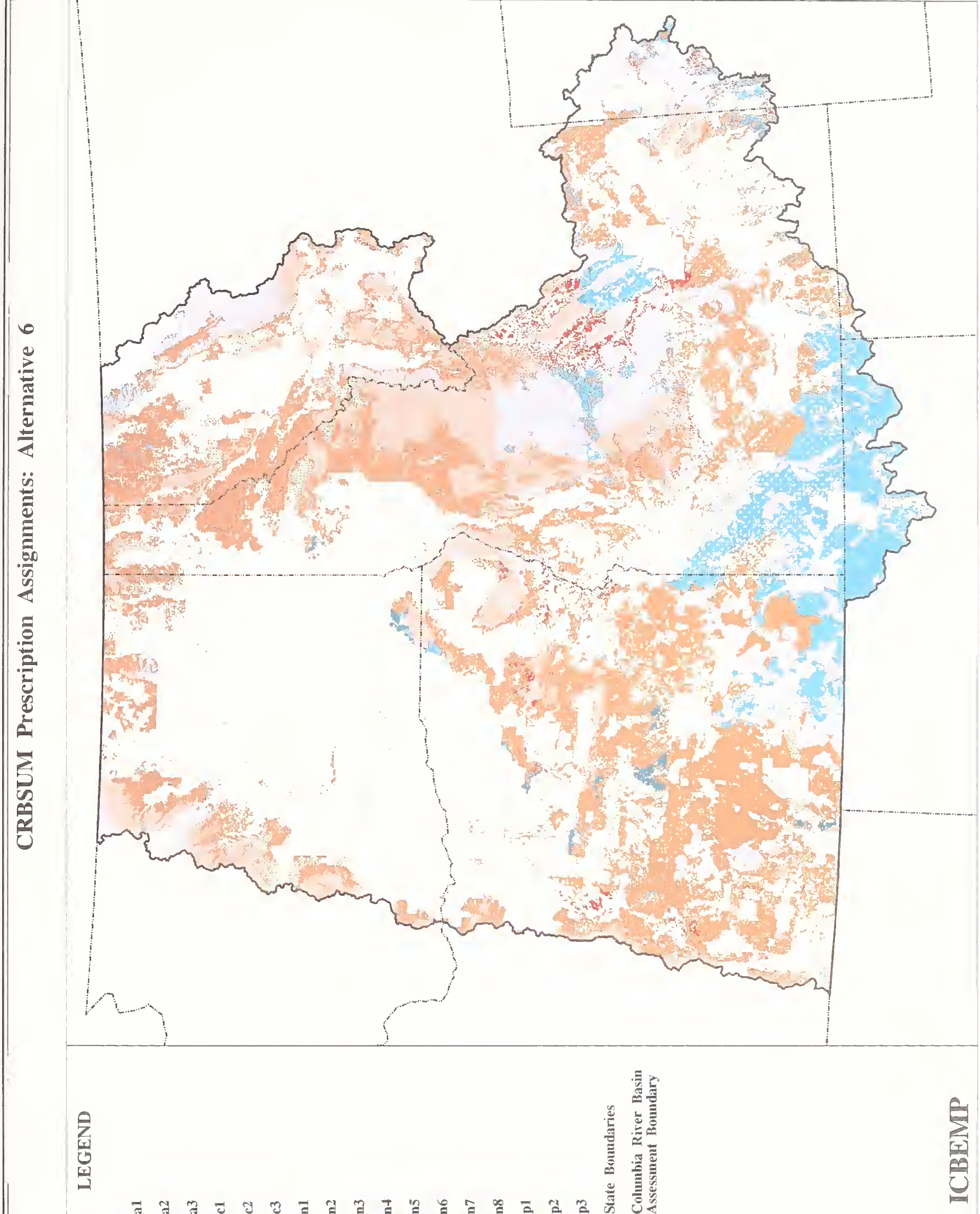
Map 2.17 – Alternative 3 management prescription (Rx) assignments for forest, rangeland, and other potential vegetation groups. Management prescriptions indicate level of management and restoration activities with probability of disturbance events for wilderness and non-wilderness roaded and roadless land management classes.



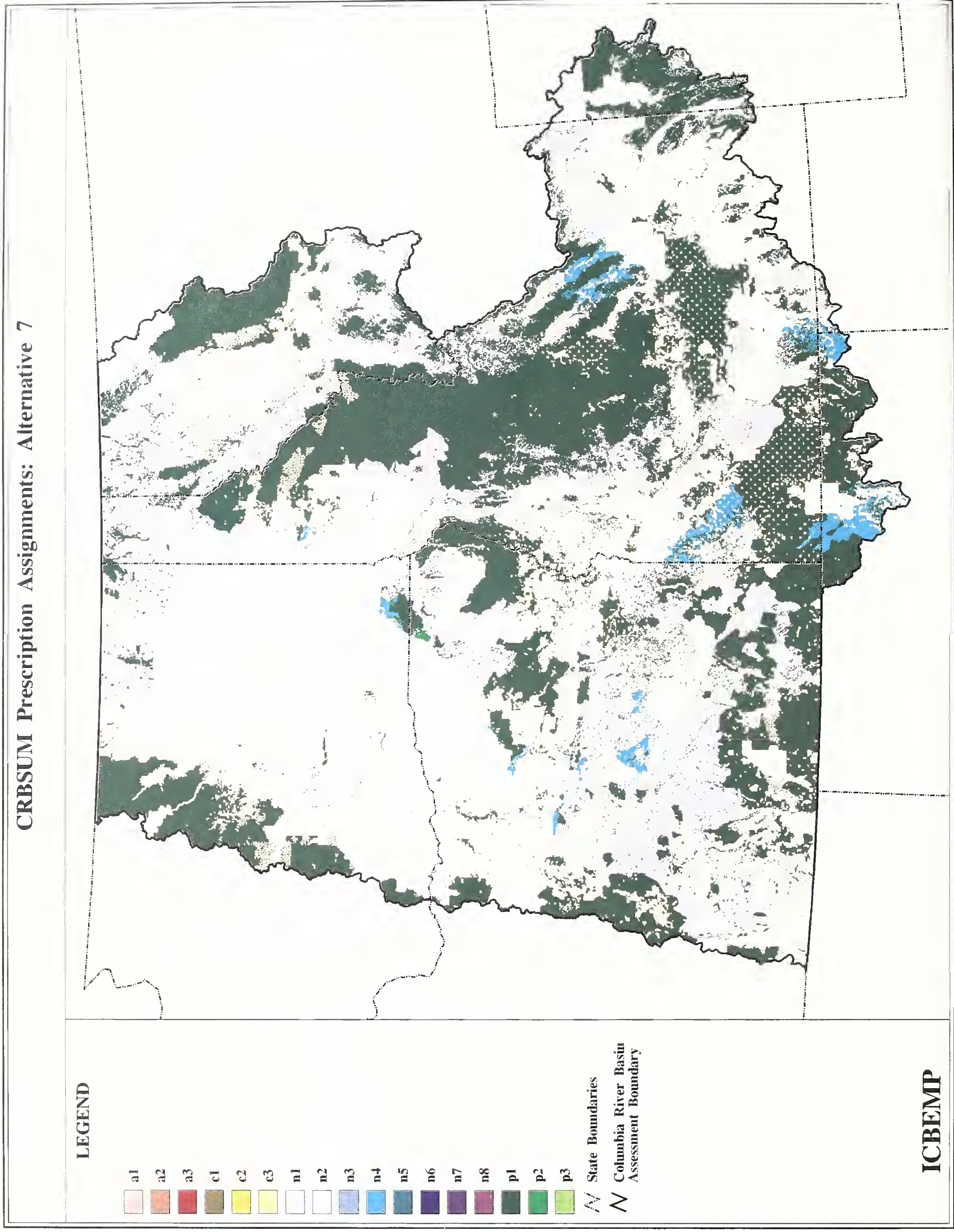
Map 2.18 – Alternative 4 management prescription (Rx) assignments for forest, rangeland, and other potential vegetation groups. Management prescriptions indicate level of management and restoration activities with probability of disturbance events for wilderness and non-wilderness roaded and roadless land management classes.



Map 2.19 – Alternative 5 management prescription (Rx) assignments for forest, rangeland, and other potential vegetation groups. Management prescriptions indicate level of management and restoration activities with probability of disturbance events for wilderness and non-wilderness roaded and roadless land management classes.



Map 2.20 – Alternative 6 management prescription (Rx) assignments for forest, rangeland, and other potential vegetation groups. Management prescriptions indicate level of management and restoration activities with probability of disturbance events for wilderness and non-wilderness roaded and roadless land management classes.



Map 2.21 – Alternative 7 management prescription (Rx) assignments for forest, rangeland, and other potential vegetation groups. Management prescriptions indicate level of management and restoration activities with probability of disturbance events for wilderness and non-wilderness roaded and roadless land management classes.

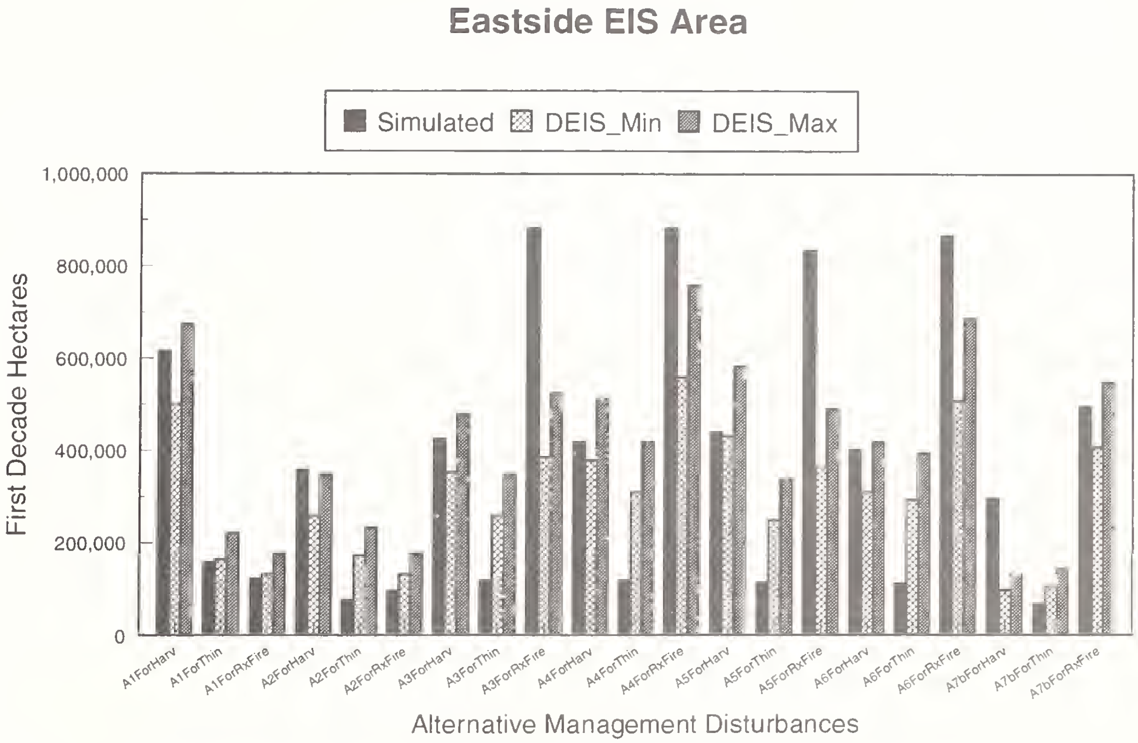


Figure 2.3 — Comparison of simulation with PDEIS forest management disturbances for the Eastside EIS area.

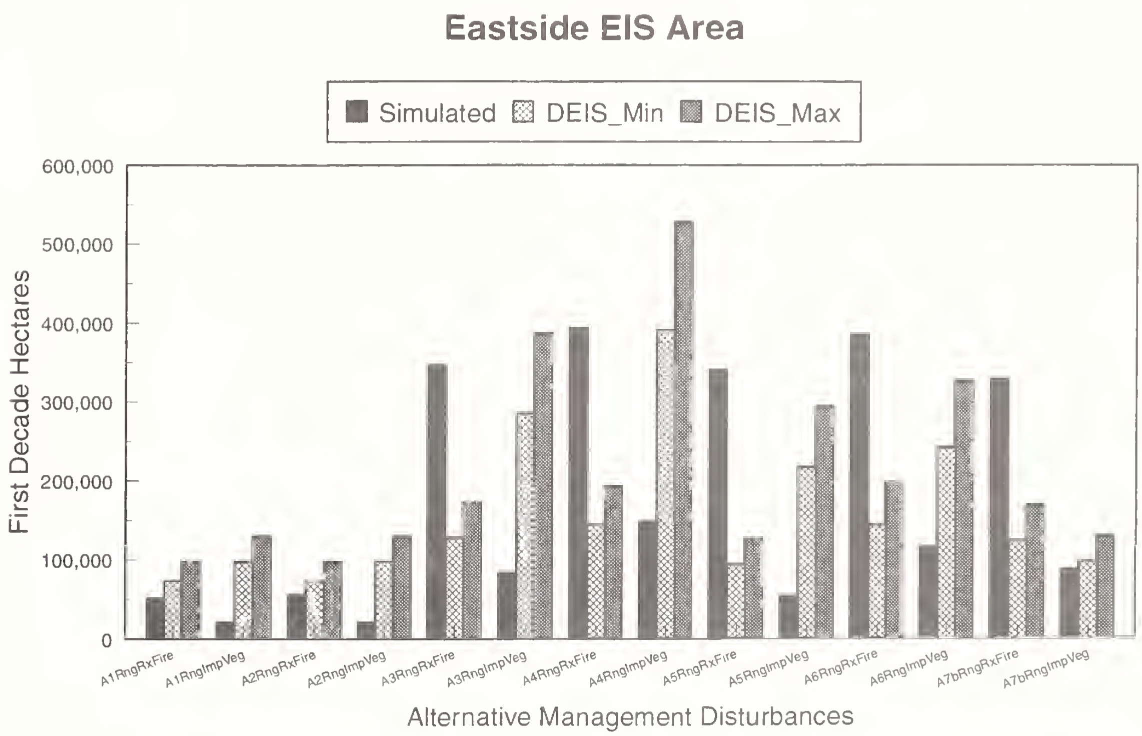


Figure 2.4 — Comparison of simulation with PDEIS range management disturbances for the Eastside EIS area.

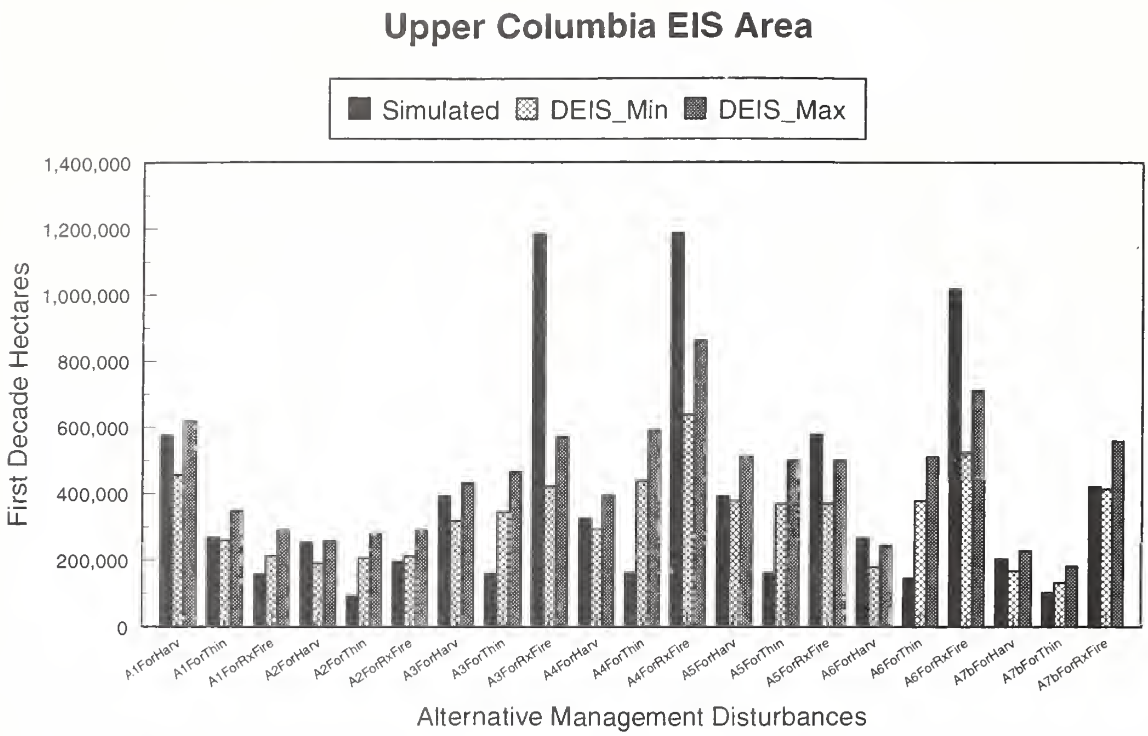


Figure 2.5 — Comparison of simulation with PDEIS forest management disturbances for the UCRB EIS area.

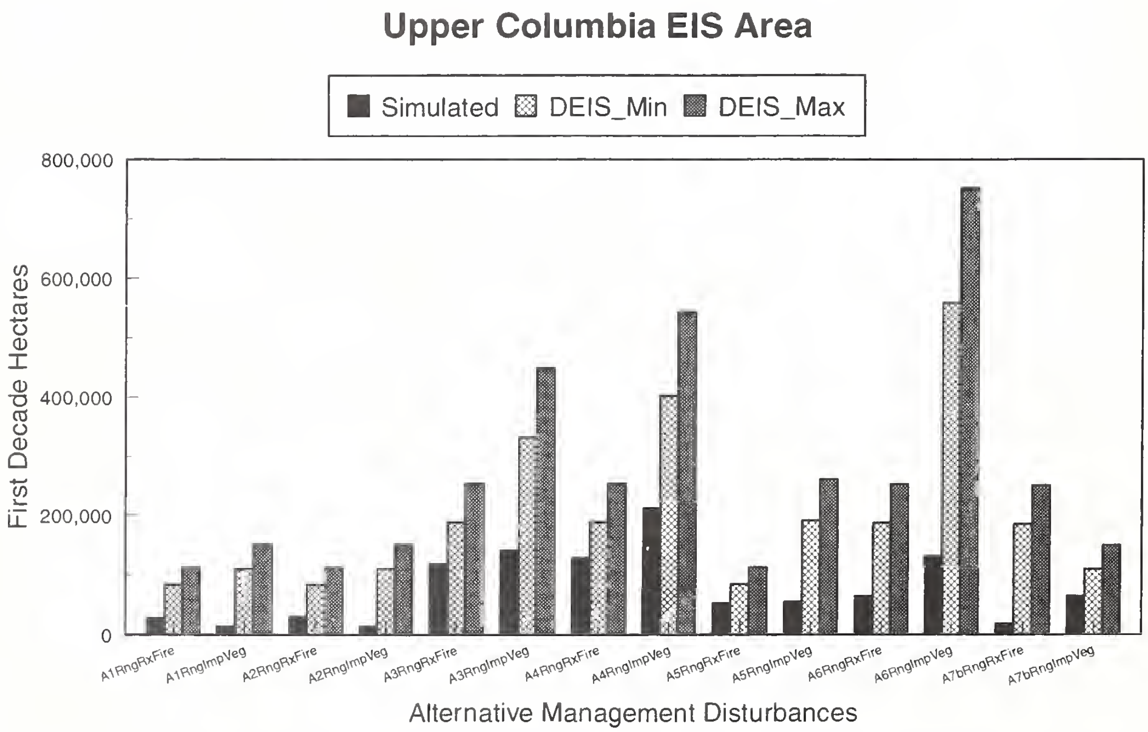


Figure 2.6 — Comparison of simulation with PDEIS range management disturbances for the UCRB EIS area.

Table 2.8 — Alternative simulations compared to the preliminary draft EIS minimum and maximum levels for forest management activities for first decade.

EIS Area[1]	Alternative	Forest Harvest, Simulation	Forest Harvest, Preliminary Draft, EIS Minimum	Forest Harvest, Preliminary Draft EIS, Maximum	Forest Thin, Simulation	Forest Thin, Preliminary Draft EIS, Minimum	Forest Thin, Preliminary Draft EIS, Maximum	Forest Prescription Burn, Simulation	Forest Prescription Burn, Preliminary Draft EIS, Minimum	Forest Prescription Burn, Preliminary Draft EIS, Maximum
		Hectares[2]								
EEIS	1	615,000	500,000	674,000	158,000	164,000	221,000	121,000	132,000	176,000
EEIS	2	358,000	259,000	348,000	77,000	172,000	233,000	95,000	132,000	176,000
EEIS	3	425,000	352,000	478,000	117,000	259,000	348,000	882,000	386,000	524,000
EEIS	4	419,000	378,000	512,000	117,000	310,000	419,000	882,000	558,000	757,000
EEIS	5	439,000	431,000	583,000	113,000	249,000	338,000	834,000	362,000	490,000
EEIS	6	401,000	310,000	419,000	111,000	293,000	395,000	866,000	508,000	686,000
EEIS	7	295,000	97,000	130,000	67,000	105,000	142,000	496,000	407,000	548,000
UCRB	1	573,000	455,000	617,000	265,000	259,000	348,000	156,000	212,000	289,000
UCRB	2	251,000	190,000	257,000	91,000	206,000	279,000	194,000	212,000	289,000
UCRB	3	391,000	318,000	431,000	160,000	344,000	465,000	1,182,000	421,000	571,000
UCRB	4	324,000	293,000	395,000	162,000	439,000	593,000	1,186,000	637,000	862,000
UCRB	5	393,000	378,000	512,000	162,000	370,000	500,000	577,000	370,000	500,000
UCRB	6	265,000	180,000	245,000	146,000	378,000	512,000	1,016,000	524,000	710,000
UCRB	7	204,000	168,000	229,000	103,000	134,000	182,000	423,000	415,000	561,000

[1]EEIS = Eastside EIS area.
UCRB = Upper Columbia River Basin EIS area.

[2]Rounded to nearest thousand; hectare = 2.47 acres.

Table 2.9 — Alternative simulations compared to the preliminary draft EIS minimum and maximum levels for range management activities.

EIS Area[1]	Alternative	Range Prescription Burn, SImulation	Range Prescription Burn, Preliminary Draft EIS, Minimum	Range Prescription Burn, Preliminary Draft EIS, Maximum	Range Vegetation Improvement, Simulation	Range Total Improvement, Preliminary Draft EIS, Minimum	Range Total Improvement, Preliminary Draft EIS, Maximum	Range Distribution, Improvement Simulation	Range Plan Implementation, Simulation
		Hectares[2]							
EEIS	1	51,000	73,000	97,000	20,000	97,000	130,000	100,000	200,000
EEIS	2	55,000	73,000	97,000	20,000	97,000	130,000	150,000	500,000
EEIS	3	346,000	127,000	172,000	83,000	285,000	386,000	300,000	500,000
EEIS	4	393,000	144,000	192,000	148,000	391,000	528,000	400,000	1,000,000
EEIS	5	340,000	93,000	125,000	53,000	217,000	293,000	250,000	500,000
EEIS	6	384,000	144,000	196,000	115,000	241,000	326,000	300,000	1,000,000
EEIS	7	328,000	123,000	168,000	87,000	97,000	130,000	150,000	200,000
UCRB	1	26,000	83,000	111,000	12,000	109,000	150,000	90,000	250,000
UCRB	2	28,000	83,000	111,000	12,000	109,000	150,000	110,000	550,000
UCRB	3	117,000	188,000	253,000	140,000	330,000	447,000	275,000	600,000
UCRB	4	127,000	188,000	253,000	212,000	401,000	542,000	300,000	1,200,000
UCRB	5	53,000	85,000	113,000	55,000	192,000	261,000	200,000	750,000
UCRB	6	65,000	188,000	253,000	130,000	556,000	751,000	150,000	1,200,000
UCRB	7	18,000	186,000	251,000	65,000	109,000	150,000	50,000	400,000

[1]EEIS = Eastside EIS area.
UCRB = Upper Columbia River Basin EIS area.

[2]Rounded to nearest thousand; hectare = 2.47 acres.

Implementation and Allocation of Activity Levels from Preliminary Draft EIS

The process of modeling management activities and landscape evaluation variables was done differently for Alternatives 1 and 2 than for Alternatives 3 through 7.

Alternatives 1 and 2

For Alternatives 1 and 2, we used a traditional programmatic process that allocated management activities through mapping prescriptions by management region and potential vegetation group to simulate the appropriate levels of management activity by EIS area and subbasin cluster.

Alternatives 3 through 7

To allocate activities for Alternatives 3 through 7, which incorporate multi-scale spatial and temporal relationships, we used a process that was based on the multi-scale assumption identified in the "Introduction" section of this chapter. This process was necessary to achieve the integrated activity sets for Chapter 3 of the preliminary draft EISs, and for the effects predictions and interpretations in this evaluation of alternatives and in Chapter 4 of the preliminary draft EISs.

The following "step-down/step-back" process provides the steps for spatial and temporal allocation of activities that would be consistent with this evaluation of alternatives and with the information provided for the effects in Chapter 4 of the preliminary draft EISs.

1. Prioritize management activity levels spatially and temporally for the selected alternative for subbasins within a cluster using an integrated proper functioning systems (landscape health) assessment for risk and opportunity analysis. Follow the same methods used for the ecosystem integrity analysis, landscape fire risk, and landscape patterns of succession/disturbance regime analysis. Conduct this prioritization to provide "best fit" to minimize risks such as erosion, sediment transport, wildfire, loss of socioeconomic opportunities, terrestrial community departure, riparian degradation, and impact on aquatic strongholds, rare terrestrial species, clean air, and clean water. Prioritizing is necessary because the effects tables were adjusted to fit the landscape assumptions of differences in strategies among Alternatives 3 through 7.

   Assess linkages to adjacent subbasins within the cluster, EIS area, and the Basin to assess cumulative effects. Compare optional "best fits" to select the prescription that minimizes risk and achieves opportunity objectives; then compare with original projections of effects to validate predictions in Chapter 4 of the preliminary draft EISs.

2. Prioritize management activity levels within subbasins at the watershed or subwatershed level, using a similar process. Conduct this prioritization to provide "best fit" to minimize negative effects as listed in Step 1. Summarize effects across watersheds or subwatersheds in the subbasin to assess cumulative effects. As in Step 1, compare optional "best fit" to select the one that minimizes risks and achieves opportunity objectives. Then compare with original projections of effects to validate preliminary draft EIS Chapter 4 predictions.

3. Design projects in context with step 2 and adjust based on site-specific conditions. Statistically extrapolate project data to update, validate, and adjust Steps 1 and 2.

Summary of Confidence in Predictions and Qualifiers

Table 2.10 provides a summary of variables and their comparability between the simulations and the preliminary draft EISs' alternative levels.

Table 2.11 provides a summary about the predictability of the terrestrial vegetation simulation results relative to the preliminary draft EISs' alternatives.

Table 2.12 provides a summary relative to simulation results by potential vegetation group and relationship to preliminary draft EISs' alternatives.

Table 2.13 provides a summary of spatial relationships of the preliminary draft EISs' alternatives to groups of forest and range cluster combinations. It also provides descriptions of alternative emphasis for forest and range cluster groups (map 2.22 and table 2.14). The five cluster groups (F, J, H, L, and M) were derived from 29 combinations of forest and range clusters based on the following criteria:

- Similar dominant management area categories
- Similar forest and range integrity
- Similar aquatic and hydrologic integrity
- Similar fire risk
- Similar amounts of urban/wildland interface.

We conclude that the simulations are adequate for the evaluation of alternatives, considering the dynamic spatial and temporal responses of vegetation, disturbances, and associated conditions. However, due to time constraints that did not allow for mapping of different prescriptions iteratively, to "best fit" direction in Chapter 3 of the preliminary draft EISs, activity levels and landscape response variables are best limited to relative comparisons of trends between alternatives, rather than absolute differences. For this broad level of planning, however, the current simulations are adequate to determine differences in relative trends of alternatives, as well as general outcomes across the EIS areas.

To utilize the activity levels' effects predictions from this evaluation, it will be critical, during alternative implementation, to assess similar variables at multiple scales consistently across BLM- and FS-administered lands within the two EIS areas.

Table 2.10 — Notes on CRBSUM simulation comparison with the preliminary draft EISs activities for evaluation of alternative simulations.

Item	Notes
Preliminary Draft EISs Forest Activity & CRBSUM Activity Comparison	Forest activities of harvest [commercial harvest/thin, thin (noncommercial thin), and prescribed fire] are moderately comparable between tables in the preliminary draft EISs and the simulations.
Watershed Restoration and Road Densities	The CRBSUM prescriptions have assumptions related to levels of watershed restoration and road densities that are generally similar to the preliminary draft EISs.
Preliminary Draft EISs Range Activity & CRBSUM Activity Comparison	Range activities of total livestock management (area), range improvements, prescribed burning, riparian restoration, and decrease in roads are generally not comparable between tables in the preliminary draft EISs and the simulations because of different definitions. Prescribed burning is comparable in a relative sense.
Preliminary Draft EISs Range Livestock Grazing Comparison to CRBSUM Simulations	Total livestock grazing in the simulations is a function of the amount of grazing effects that affect vegetation change (modeled in CRBSUM) and the amount of grazing that does not affect vegetation change (not modeled in CRBSUM). The second effects are related to assumptions in the prescription models concerning emphasis on achieving livestock distribution and seasonal utilization objectives, which are functions of range plan revisions and permit administration. This is not reflected in the simulation tables, due to a lack of time and insufficient information in the preliminary draft EISs on rate and type of allotment plan revisions and permit administration. However, the CRBSUM simulation trends for vegetation response generally represent the preliminary draft EISs' livestock grazing standards by accounting for effects that change vegetation.
Range Riparian Restoration	At the scale of CRBSUM simulation, the riparian potential vegetation group and the existing vegetation are not modeled accurately. Consequently, there is no comparison between the riparian restoration amounts in the simulations and the preliminary draft EISs. The amounts of riparian are under-estimated for narrow riparian stringers in CRBSUM and over estimated for large patches of riparian. The trends in response over time of the riparian vegetation simulations represent a more negative outcome for Alternatives 2 through 6 than the desired future conditions and standards for those alternatives would indicate. Trends in riparian response for Alternatives 1 and 7 are generally correct.
Range Decrease Roads	CRBSUM simulations do not report decrease in roads, whereas each of the prescription simulations include assumptions about road densities and watershed restoration.

Table 2.11 — Notes on CRBSUM evaluation of alternative simulations for terrestrial communities.

Item	Notes
Simulation Response of Terrestrial Communities	The general responses of terrestrial communities for the historical range of variability and the alternative simulations represent expected outcomes. The communities listed below have particular notes about use of the information.
Graph Scale Concerns	The bar chart and line graphs tend to over-emphasize the differences in response trend for communities with small amounts, and under-emphasize for communities with large amounts.
Range Riparian Terrestrial Communities	The historical range of variability for riparian communities, as simulated by CRBSUM, is non-applicable because: (1) the scale and type of current mapping are too coarse to depict the stringer riparian types and over-emphasize the large patch types; and (2) historical mapping did not map riparian types separate from the upland forest and range types. The CRBSUM trends in vegetation response by alternative for riparian types are useful when placed in the context of scale. The trends in response over time of the riparian vegetation simulations represent a more negative outcome for Alternatives 2 through 6, than the desired future conditions and standards for those alternatives. Trends in riparian response for Alternatives 1 and 7 are generally correct. The increase of riparian herb in Alternative 7 is primarily due to wildfire in riparian woodland and shrub types.
Forest Riparian Communities	Because the scale of the forested riparian communities are not separate from the upland communities, assume that the forested riparian community has a similar trend to disturbances as the forested upland community. CRBSUM did not account for these differences in forested riparian desired future conditions and standards from the preliminary draft EISs. Consequently, the response of forested riparian to timber harvest standards is more conservative in Alternatives 2 through 7 than the simulation models.
Exotic Herbland	Exotic trend response is generally correct on a relative basis among alternatives, except in Alternative 2, which should be similar to Alternative 1. Exotics are generally replacing upland shrub due to fire and/or livestock grazing, so the concurrent decline of upland shrub in Alternative 2 should be similar to Alternative 1. Rates of exotic increase across alternatives are modeled with conservative increase rates. While it is highly probable that exotics could increase at faster rates, the rates used are the best estimate at a landscape level. Most of the exotics are in the dry shrub and dry grass potential vegetation groups.
Upland Herbland	The upland herb response generally simulates the expected historical range of variability and alternative response. Most transitions from upland herb go to upland shrub, upland woodland, to early- or mid-seral forest in the 100 years of current to historical. Most transitions to upland herb come from upland shrub, upland woodland, and late-seral forest fire disturbance in the 100 years of current to historical. The upland herb is common in the dry grass, dry shrub, cool shrub, and dry forest potential vegetation groups.
Upland Shrubland	The upland shrub response generally simulates the expected historical range of variability and alternative response. Most transitions from upland shrub go to exotic or upland herb with fire; or to upland woodland, early-seral, or mid-seral forest with succession in the 100 years of current to historical. Most transitions to upland shrub come from upland herb with succession; or from upland woodland and late-seral forest with fire disturbance in the 100 years of current to historical. Most upland shrub is in the dry or cool shrub potential vegetation groups.

Table 2.11 (continued)

Item	Notes
Upland Woodland	The upland woodland response generally simulates the expected historical range of variability and alternative response. Most transitions from upland woodland go to upland herb or exotic herbland with fire or cutting; in the 100 years of current to historical. Most transitions to upland woodland come from upland shrub with succession in the 100 years of current to historical. The upland woodland occurs in the woodland, the dry shrub, the dry grass, the cool shrub, and the dry forest potential vegetation groups. Most of the encroachment type is on the dry shrub, cool shrub, and dry forest potential vegetation groups. The models emphasize restoration by burning or cutting of woodlands on the dry shrub potential vegetation groups. Consequently, the Eastside EIS shows a decline in woodlands compared to current. In the Upper Columbia River Basin EIS area, however, most upland woodland is on cool shrub and dry forest, so this emphasis is not present and there is an associated increase of woodlands.
Late-seral Multi-layer Communities in Relation to Mid-seral	There is a general trend to more late-seral multi-layer communities across all alternatives, due to the transition of a large component of the current mid-seral into late-seral. These forests are typically on steep, usually roadless areas, in lethal crown fire regimes that were burned in the late 1800s and early 1900s. In Alternative 1 forest and resource plans, these types would not likely be harvested due to their unlikelihood for reaching the late-seral stage and given the steep slopes and generally roadless terrain. They are more likely to recycle to early-seral due to their tendency to occur in large patches and the associated potential for large wildfires, insect infestation, root disease, and stress mortality.
Early-seral Lower Montane Forest	Simulation generally represents the historical range of variability and differences among alternatives. Much of the early-seral lower montane forest comes from harvest or fire in the moist forest potential vegetation group and associated montane communities. Consequently, there is a greater increase in the Upper Columbia River Basin EIS area where there is more of this potential vegetation group.
Late-seral Lower Montane Forest	Simulation generally represents the historical range of variability and differences among alternatives.
Late-seral Lower Montane Forest Multi-layer	Simulation generally represents the historical range of variability and differences among alternatives.
Late-seral Lower Montane Forest Single-layer	Simulation generally represents the historical range of variability and differences among alternatives.
Early-seral Montane Forest	Simulation generally represents the historical range of variability and differences among alternatives.
Late-seral Montane Forest	Simulation generally represents the historical range of variability and differences among alternatives.
Late-seral Montane Forest Multi-layer	Simulation generally represents the historical range of variability and differences among alternatives.
Late-seral Montane Forest Single-layer	Simulation generally represents the historical range of variability and differences among alternatives.
Early-seral Subalpine Forest	Simulation generally represents the historical range of variability and differences among alternatives.
Late-seral Subalpine Forest	Simulation generally represents the historical range of variability and differences among alternatives.
Late-seral Subalpine Forest Multi-layer	Simulation generally represents the historical range of variability and differences among alternatives.
Late-seral Subalpine Forest Single-layer	Simulation generally represents the historical range of variability and differences among alternatives.

Table 2.12 — Notes on response of potential vegetation groups for CRBSUM evaluation of alternative simulations.

Item	Notes
Simulation Level	The CRBSUM evaluation of alternatives simulations are based on the prescription models mapped at a forest or range level, not at the potential vegetation group (PVG) level. There is varying emphasis by potential vegetation group based on the preliminary draft EISs, alternative desired future conditions, and standards. We did not vary prescriptions models by potential vegetation group within forest or range at the time of simulation due to lack of time and changing desired future conditions and standards within the preliminary draft EISs.
Rangeland Riparian PVGs	The CRBSUM simulation of riparian is non-applicable due to the scale of historical and current riparian mapping. Scale and type of current mapping are too coarse to depict the stringer riparian types and over-emphasize the large patch types. The historical mapping did not map riparian types as separate from the upland forest and range types. The CRBSUM trends in vegetation response by alternative for riparian types are useful when placed in the context of scale. Response trends of the riparian vegetation simulations over time represent a more negative outcome for Alternatives 2 through 6, than for the desired future conditions and the standards for those alternatives. Riparian response trends for Alternatives 1 and 7 are generally correct.
Rangeland Dry Shrub, Dry Grass, and Woodland PVGs	The CRBSUM simulation of these types generally meets the expectations, but does not have the restoration emphasis in Alternatives 4 and 6 that could be simulated if prescriptions were mapped to the potential vegetation group level. Based on the preliminary draft EISs' description of alternatives, there should be more restoration in Alternatives 4 and 6 than Alternatives 3 and 5, which have more than Alternatives 1, 2, and 7. This prioritization is not simulated in the current mapping of prescriptions. However, the current prescription for fire suppression does emphasize increased fire suppression in these potential vegetation groups to reduce rates of increase of annual grasses. Exotic trend response in these potential vegetation groups is correct, except in Alternative 2 where exotics increase more rapidly than other alternatives. However, Alternative 2 exotics are generally replacing upland shrub due to fire and/ or livestock grazing, so their response should be similar to Alternative 1. The upland woodland cutting and the restoration to upland herb and shrub is occurring primarily in these potential vegetation groups, not in the woodland potential vegetation group. There are more dry shrub, dry grass, and woodland potential vegetation groups in the Eastside EIS area than in the Upper Columbia River Basin EIS area.
Rangeland Cool Shrub PVGs	The CRBSUM simulation of this type meets expectations, except for lacking emphasis on restoration using prescribed fire, exotic forb control, and control of encroachment conifer and woodland in Alternatives 4 and 6 that could be simulated if prescriptions were mapped to the potential vegetation group level. Based on the preliminary draft description of alternatives, the restoration level in Alternatives 4 and 6 should be more than Alternatives 3 and 5, which have more than Alternatives 1, 2, and 7. Because this prioritization is not simulated in the current mapping of prescriptions, there is more cool shrub type in the Upper Columbia River Basin EIS area than in the Eastside EIS area.

Table 2.12 (continued)

Item	Notes
Forest PVGs	The CRBSUM simulation of these types generally meets expectations. However, the dry forest potential vegetation group does not have emphasis on using prescribed fire, exotic forb control, and harvest/thinning to restore native structures in Alternatives 4 and 6 that could be simulated if prescriptions were mapped to the potential vegetation group level. Based on the preliminary draft EISs' description of alternative, there should be more restoration in Alternatives 4 and 6 than in Alternatives 3 and 5, which have more than Alternatives 1, 2, and 7. In general, range management is not simulated to the same level in the forest potential vegetation group as in the range potential vegetation group, the desired future conditions, and the standards in the preliminary draft EISs. The reason for this disparity is the time constraint to develop the more complex forested range relationships that occur in these potential vegetation groups.

Table 2.13 — Notes on alternative assumptions relative to spatial prioritization of activities compared to CRBSUM simulation of activities.

Group[1] and Alternative	Notes
<u>*Group F*</u>	*This group of subbasins represents areas with high levels of urban and wildland interface influence, high fire risks in those zones, and low overall ecological integrity. Subbasins are dominated by the dry forest potential vegetation group (PVG) with intermixed range PVGs.*
Alt. 1 & 2	No particular emphasis in comparison to other groups, except more activities than group H.
Alt. 4 & 6	High emphasis on forest composition, structure, and process restoration activities. Slower rate of implementation in Alternative 6 than Alternative 4.
Alt. 3	Low emphasis on activities relative to Alternatives 4 and 6 due to local concerns for maintenance of forested visual conditions and big game hiding cover.
Alt. 5	Low emphasis on activities relative to Alternatives 4 and 6 due to lack of high net benefit and productivity returns.
Alt. 7	Similar emphasis on activities in this group as for Alternative 3.
<u>*Group J*</u>	*This group of subbasins represents areas with high to moderate levels of urban and wildland interface influence, high fire risks in those zones, and moderate overall ecological integrity. Subbasins are dominated by the dry forest potential vegetation group, with intermixed range potential vegetation groups.*
Alt. 1 & 2	No particular emphasis compared to other groups, except more activities than group H.
Alt. 4 & 6	High emphasis on forest composition, structure, and process restoration activities in this group. Slower rate of implementation in Alternative 6 than Alternative 4, and less emphasis than in group F.
Alt. 3	Similar emphasis on activities in this group relative to Alternatives 4 and 6.
Alt. 5	Low emphasis on activities relative to Alternatives 4 and 6 due to lack of high net benefit and productivity returns.
Alt. 7	Similar emphasis on activities as Alternative 3.

Table 2.13 (continued)

Group[1] and Alternative	Notes
Group L	*This group includes subbasins that have moderate levels of urban/wildland interface influence, moderate to high fire risk in those zones, and low integrity. Subbasins are typically dominated with woodland, dry shrub, or dry forest potential vegetation groups. Dry forest dominated subbasins are typically intermixed with range potential vegetation groups.*
Alt. 1 & 2	No particular emphasis in comparison to other groups, except more activities than group H.
Alt. 4 & 6	High emphasis on forest and/or range composition, structure, and process restoration activities. Emphasis on exotic control. Emphasis on fire suppression in dry shrub and dry grass potential vegetation groups. Slower rate of implementation in Alternative 6 than in Alternative 4.
Alt. 3	High emphasis on forest management activities due to local concerns. High emphasis on range activities due to concentrated public land base, working relationships with permittees, and available resources.
Alt. 5	Low emphasis on activities relative to Alternatives 4 and 6 due to lack of high net benefit and productivity returns.
Alt. 7	Similar emphasis on activities as in Alternative 3.
Group M	*This group includes subbasins that have low to moderate levels of urban/wildland interface influence, low to moderate fire risk in those zones, and fair to high productivity. Integrity on forest dominated subbasins is low, but productivity is high and the succession response relative to restoration opportunities is rapid. However, these subbasins have major historic effects of blister rust on western white pine. Large areas within the forest subbasins are now dominated by shrubs or insect/disease, stress, and fire-susceptible tree species, with high risk of cycling. Range-dominated subbasins have moderate integrity and productivity, with good opportunities to conserve or restore ecological integrity.*
Alt. 1 & 2	No particular emphasis in comparison to other groups, except more activities than group H.
Alt. 4 & 6	High emphasis on: (1) forest and/or range composition, structure, and process restoration activities; (2) western white pine recovery in the forest dominated subbasins; and (3) watershed restoration via road density reductions. Emphasis on fire suppression, exotic control, and restoration of natives in range dominated subbasins. Emphasis on fire suppression in dry shrub and dry grass potential vegetation groups on range dominated subbasins. Slower rate of implementation in Alternative 6 than in Alternative 4.
Alt. 3	Moderate emphasis in forest dominated subbasins on forest management activities due to local concerns. Primary local emphasis will be to maintain flow of timber to the mills. High emphasis in range-dominated subbasins on range activities due to concentrated public land base, working relationships with permittees, and available resources.
Alt. 5	High emphasis on commodity production in the forest dominated subbasins relative to Alternatives 4 and 6. Similar emphasis as group L on range dominated subbasins.
Alt. 7	Similar emphasis as Alternative 3 for forest dominated subbasins. Reserve areas present in the range dominated subbasins.
Group H	*This group includes subbasins that have low urban/wildland interface influence, but high levels of semi-primitive and peripheral developed recreation use, moderate fire risk in those zones, and high integrity. A substantial amount of these subbasins is in wilderness or roadless condition. Forests have low departures from the historic range of variability in comparison to other subbasin groups. These subbasins contain the largest amount of cold forest, which has the historic effect of blister rust on whitebark pine; blister rust causes substantial changes in forest composition, structure, and processes in the subalpine zone. Dry forest potential vegetation groups are also common, and fires in this zone can be large and intense. Intermixed range potential vegetation groups are generally low departure from the historical range of variability.*
Alt. 1 & 2	Less emphasis on activities at the broad scale compared to other groups due to high amounts of designated wilderness. However, substantial projected roading at the watershed level in roadless areas around wilderness areas.

Table 2.13 (continued)

Group[1] and Alternative	Notes
Alt. 4 & 6	High emphasis on conservation of high integrity and associated forest and/or range composition, structure, and processes via protection from development and management for natural processes, such as prescribed natural fire, including both planned and unplanned ignitions. High emphasis on whitebark pine recovery in the cold forest potential vegetation groups.
Alt. 3	High emphasis on conservation due to local concerns about development and visuals. Moderate emphasis on restoration of whitebark pine. Moderate emphasis on restoring composition, structure, and processes.
Alt. 5	Low emphasis on commodity production. High emphasis on recreation use. Low emphasis on restoration, relative to Alternatives 4 and 6.
Alt. 7	Primarily in reserve areas. Expect unpredictable fire and insect/stress events. Successional cycles not expected to achieve restoration objectives since areas have tendency toward urban/wildland interface areas where there is high concern for maintaining visual conditions. Consequently, many fire starts would be suppressed. Only large fires would not be controlled. Exotics would continue to spread. No recovery of whitebark pine.

[1]Refers to map 2.22 "FS and BLM Lands CRBSUM Forest and Range Cluster Groups."

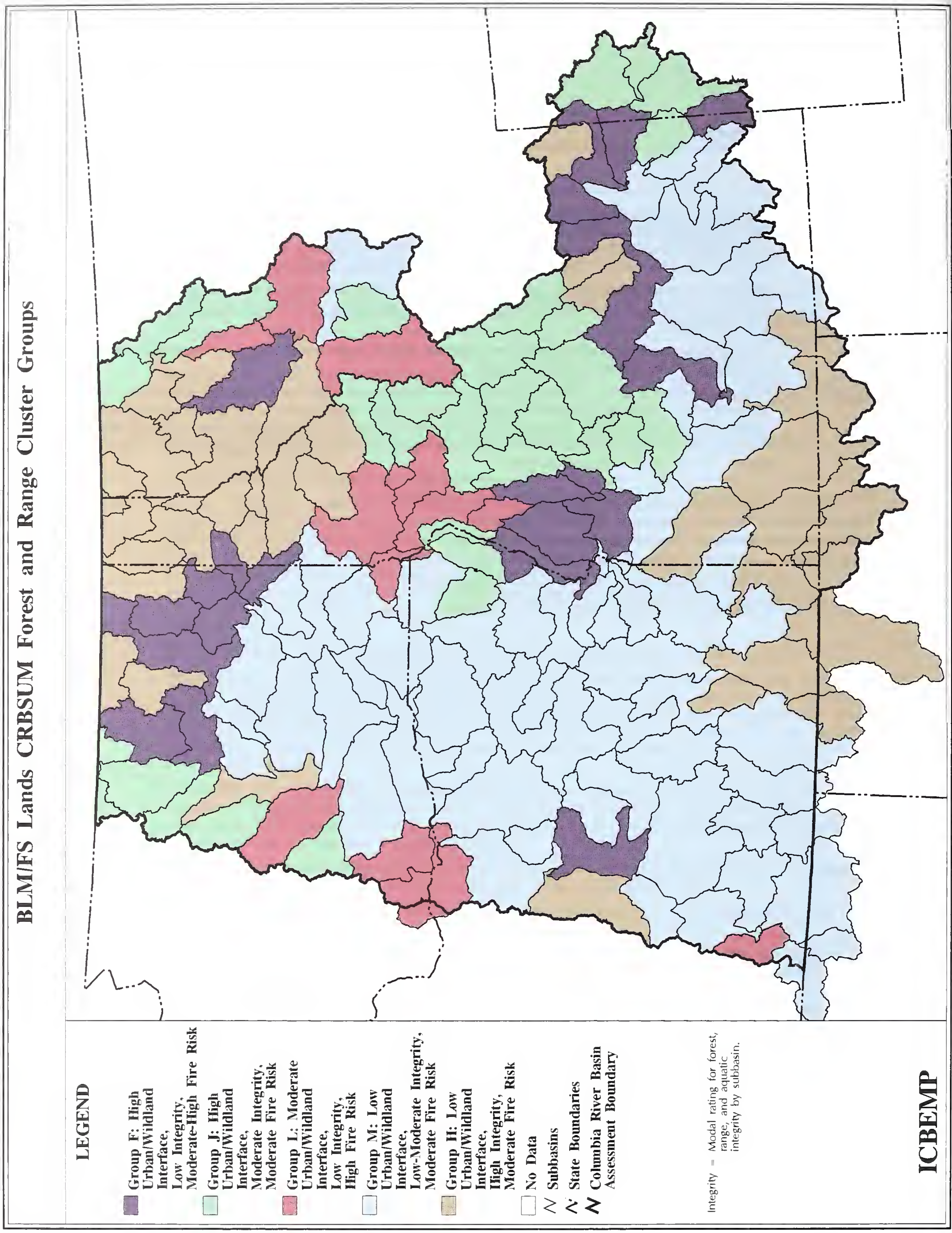
Group F: high urban/wildland interface, low integrity, moderate-high fire risk.

Group J: high urban/wildland interface, moderate integrity, moderate fire risk.

Group L: moderate urban/wildland interface, low integrity, high fire risk.

Group M: low urban/wildland interface, low-moderate integrity, moderate fire risk.

Group H: low urban/wildland interface, high integrity, moderate fire risk.



Map 2.22 – Groups of forest and range clusters based on similarities in aquatic, forest, and rangeland integrity, fire risk, and urban-rural/wildland interface for summarizing CRBSUM response.

Table 2.14 — River subbasin grouping for display of preliminary draft EIS BLM/FS management and other disturbances, and associated effects.

Subbasin Group Legend	Description
High Urban/Wildlands (F) Low Integrity Mod-High Fire Risk	▸ Dry river subbasins with high amounts of urban/wildland interface and moderate to high fire risk in those areas. ▸ Generally low consideration of aquatic, and mixed low to moderate consideration for forest and range integrity. ▸ Low amounts of wilderness and semi-primitive areas. ▸ Moderate to high amounts of BLM- and FS-administered lands. ▸ Includes forest cluster 6 and some range clusters 3 and 6.
High Urban/Wildlands (J) Low Integrity Moderate Fire Risk	▸ River subbasins with high/some moderate amounts of urban/wildland interface and moderate fire risk in those areas. ▸ Generally moderate consideration for aquatic and range, and low to moderate for forest integrity. ▸ Moderate amounts of wilderness and semi-primitive areas, typically in the headwaters. ▸ Moderate to high amounts of BLM- and FS-administered lands. ▸ Includes forest cluster 3 and some range cluster 3.
Mod Urban/Wildlands (L) Low Integrity High Fire Risk	▸ Dry forest or range-dominated river subbasins with moderate amounts of urban/wildland interface and high fire risk in those areas. ▸ Low consideration for forest integrity and low, with some moderate consideration for aquatic and range integrity. ▸ Low amounts of wilderness and semi-primitive areas. ▸ Mixed low to high amounts of BLM- and FS-administered lands. ▸ Includes forest clusters 5 and 7, and primarily range clusters 3 and 6.
Low Urban/Wildlands (M) Low-Moderate Integrity Moderate Fire Risk	▸ Moist forest-dominated or cooler range-dominated river subbasins with low urban/wildland interface and moderate fire risk in those areas. ▸ Low to moderate consideration for aquatic and forest integrity, with moderate to high for range integrity. ▸ Low to moderate levels of wilderness and semi-primitive areas. ▸ High amounts of BLM- and FS-administered lands. ▸ Includes forest clusters 4 and 7, and primarily range clusters 5 and 7.
Low Urban/Wildlands (H) High Integrity Moderate Fire Risk	▸ River subbasins with low amounts of urban/wildland interface and moderate fire risk in those areas. ▸ High, with some moderate, consideration of forest, range, and aquatic integrity. ▸ High amounts of wilderness and semi-primitive areas. ▸ High amounts of BLM- and FS-administered lands. ▸ Forest clusters 1 and 2, and primarily range clusters 2 and 5.

Evaluation of Landscape Disturbances

To evaluate the landscape's response to variation in alternative management of disturbance, we grouped disturbances that change vegetation into general categories for forest or rangeland systems. These groups consider management treatments as well as unplanned disturbance events. Forest disturbance groups include: prescribed fire, thinning and harvest, wildfire, crown wildfire, and forest mortality susceptibility. Range disturbance groups include: prescribed fire, range nonstructural and structural improvements, plan revision/implementation, grazing, the invasion of exotic plants, and wildfire. These lists do not include all disturbances and changes occurring on the landscape over time, but rather the types of disturbance events most directly influenced by the alternatives presented in the preliminary draft EISs for the Eastside (EEIS) and the Upper Columbia River Basin (UCRB EIS).

Landscapes are dynamic, continually changing in association with natural and human-influenced biotic growth, death, and environmental fluctuations (White and Pickett 1985). Because of this continual change, we were unable to predict the long-term effects of all the disturbances likely to occur across the landscape. Our objective in this evaluation of landscape disturbances was to predict the outcomes that would be different as a result of implementing the various management strategies in the alternatives. The effects of disturbances were evaluated primarily by the area affected over the first decade (1 to 10 years) and long term (50 to 100 years). Disturbance areas were summarized by Ecological Reporting Unit (ERU), potential vegetation group (PVG), management area, and class.

Relation of Disturbance Levels and Standards in Preliminary Draft EISs to Evaluation of Alternatives

It is important to emphasize that the management-prescribed disturbance levels for harvest, prescribed fire, grazing, range improvement, and roads from the preliminary draft EISs do not necessarily represent the ecological or resource outcomes in the long term. These activity levels are the levels estimated by the EIS teams based on the alternative theme, desired future conditions, and funding constraints for the first decade. Activity levels that can actually be implemented are contingent upon actual cause-and-effect relationships. Landscape conditions change spatially and temporally in response to relationships between components and natural and human-influenced disturbances. The standards of the preliminary draft EISs often represent single state/size conditions that do not represent the "best fit" to the biophysical system in concert with inherent disturbance processes. In order to avoid conflicts of single state/size standards with the alternative theme, DFCs, and activity levels we assumed that such standards would be changed to reflect an "ecological landscape fit" prior to implementation of substantial amounts of activities.

The CRBSUM model is designed to simulate cause-and-effect relationships across space and through time. The activity levels in the preliminary draft EISs include adjustments for cause-and-effect relationships based upon two iterations of desired levels, CRBSUM modeling of disturbances and outcomes, and analysis feedback. Sufficient time was not available to resolve differences between the desired activity levels and CRBSUM model projections to integrate the effects of broad-, mid-, and fine-scale alternative direction in the preliminary draft EISs. However, these differences may not substantially effect the relative differences between alternatives. There are substantial conflicts between single state/size standards and biophysical capabilities and inherent disturbance processes. However, as mentioned previously, we assumed these standards would be fitted ecologically, based on landscape patterns of biophysical conditions and succession/disturbance regimes, prior to substantial management-induced change.

For comparison of the 100-year average outcomes of terrestrial communities, physiognomic types, disturbance, and associated resource values (such as grazing, scenic integrity, and timber volume), we can generally assume that the relative relationships between the desired activity levels in the preliminary draft EISs and the modeled activity levels are similar. For mid- and fine-scale attributes, the statistical variability of the correlates with broad-scale attributes that were used for projections is generally higher than the variability associated with relatively refined changes in activity levels. Consequently, we are generally confident that the relative differences between alternatives for all attributes reflect the general differences between alternatives at all scales.

Forest Disturbances

Prescribed Fire — In both EIS areas, Alternatives 1 and 2 project substantially less prescribed fire in forests than any of the other alternatives in the first decade, as well as over the long term (table 2.15, figures 2.7 and 2.8). Alternative 7 would have more prescribed fire than Alternatives 1 and 2, but about half the level of Alternatives 3 through 6. However, the prescribed fire in Alternatives 3 through 6 would be primarily designed to mimic native fire processes. Prescribed fire in the non-reserve areas of Alternative 7 would be similar to Alternative 3. Some prescribed natural fires (unplanned ignitions) would occur in the reserves of Alternative 7, but because of national fire suppression policy constraints, most fires would not be allowed to burn as prescribed natural fires. Consequently the fires that occur would be wildfires.

There were relatively small differences in levels of prescribed fire in the two EIS areas. Within the Eastside EIS area, the projections for Alternatives 3, 4, and 6 had similar amounts of area affected. In the Upper Columbia River Basin EIS area, Alternatives 3 and 4 were projected to affect slightly more area than Alternative 6. In both EIS areas, Alternative 5 was projected to affect slightly less area with prescribed fire than Alternative 6.

Thinning and Harvest — In both EIS areas, thinning was projected to be substantially higher in Alternative 1 than all other alternatives and less in Alternative 2 (table 2.15 and figures 2.9 and 2.11). However, the thinning practices of Alternative 1 and Alternative 2 would be traditional treatments, rather than treatments designed to mimic native disturbance regimes as in Alternatives 3 through 7. Thinning treatments to mimic native structure would be emphasized in Alternatives 3 through 6, and the non-reserve portions of Alternative 7. These kinds of treatments would achieve similar vegetation structures as, or in combination with, prescribed burning that mimics native fire regimes. Alternative 7 would have a thinning level similar to Alternative 2, and the levels of area thinned by Alternatives 3 through 6 would be very similar.

The projected levels of harvest among alternatives followed a pattern similar to the levels of thinning (table 2.15 and figures 2.10 and 2.12). The ecological harvest treatments of Alternatives 3 through 6 would result in vegetation structure and composition similar to the native regime. Vegetation structure and composition from thinning and harvest in Alternative 7 non-reserve areas would be similar to Alternative 3, and reserve areas would be primarily affected by wildfire. Although we simulated little change between alternatives for Other ownerships,[1] we assume that Alternatives 2, 6, and 7, with substantially lower harvest and thinning levels, would result in increased harvest on Other forest ownerships.

Wildfire — The projected amount of wildfire was highest in Alternative 7, which would burn approximately 9 percent of the area each decade (figures 2.13 and 2.14; table 2.15). Alternatives 1 and 2 would burn about 7 percent, and Alternatives 3 through 6 would burn approximately 5 percent. Considering the amount of BLM/FS lands, these differences among alternatives are substantial.

[1]All ownerships - all lands in the Basin or EIS area; BLM/FS ownerships - public lands administered by the BLM and FS in the Basin or EIS area; Other ownerships - private, state, tribal, and non-BLM/FS federal public lands (such as National Parks, and Fish and Wildlife Service Refuges) in the Basin or EIS area.

Table 2.15 — Percent of BLM/FS lands disturbed in the first decade and in the long-term (50 to 100 years).

Projection Years	Management Area	Alternative 1	2	3	4	5	6	7
Forest - Harvest								
First decade	EEIS	13.68	7.95	9.42	9.31	9.73	8.91	6.57
First decade	UCRB	7.77	3.40	5.30	4.40	5.33	3.60	2.77
Long-term	EEIS	12.26	7.22	8.87	8.70	8.90	8.33	5.92
Long-term	UCRB	7.17	3.14	5.09	4.64	5.01	3.82	2.79
Forest - Thinning								
First decade	EEIS	3.52	1.71	2.61	2.59	2.54	2.49	1.48
First decade	UCRB	3.59	1.24	2.16	2.21	2.20	1.97	1.41
Long-term	EEIS	5.09	2.48	3.14	3.17	3.08	3.01	1.80
Long-term	UCRB	3.88	1.28	1.87	1.88	2.05	1.67	1.26
Forest - Prescribed Fire								
First decade	EEIS	2.04	1.60	14.89	14.91	14.07	14.61	8.37
First decade	UCRB	1.52	1.91	11.56	11.60	9.55	9.94	4.13
Long-term	EEIS	2.42	2.11	15.74	15.76	14.96	15.43	8.81
Long-term	UCRB	1.66	1.95	11.65	11.66	9.61	10.03	4.03
Forest - Wildfire								
First decade	EEIS	7.81	8.13	5.58	5.61	5.81	5.82	9.41
First decade	UCRB	5.86	6.14	4.27	4.25	4.64	4.61	7.72
Long-term	EEIS	7.88	8.21	5.19	5.21	5.40	5.42	9.33
Long-term	UCRB	6.28	6.72	4.35	4.38	4.87	4.93	8.40
Range - Exotics[1]								
First decade	EEIS	0.64	2.61	0.30	0.33	0.35	0.27	0.51
First decade	UCRB	1.35	1.71	0.70	0.75	1.04	0.41	0.52
Long-term	EEIS	0.89	0.89	0.39	0.49	0.46	0.43	0.58
Long-term	UCRB	1.28	1.28	0.81	0.90	1.00	0.54	0.60
Range - Prescribed Fire								
First decade	EEIS	0.90	0.96	6.02	6.86	5.94	6.70	5.72
First decade	UCRB	0.41	0.43	1.78	1.93	0.81	0.99	0.88
Long-term	EEIS	0.62	0.60	2.96	3.05	2.92	2.97	2.51
Long-term	UCRB	0.36	0.33	0.98	0.99	0.54	0.58	0.45
Range - Range Improvement								
First decade	EEIS	0.23	0.23	0.95	1.68	0.60	1.30	0.98
First decade	UCRB	0.10	0.10	1.23	1.88	0.48	1.14	0.57
Long-term	EEIS	0.40	0.43	0.66	0.85	0.53	0.72	0.56
Long-term	UCRB	0.15	0.15	0.65	0.76	0.32	0.40	0.22
Range - Grazing Effects								
First decade	EEIS	35.75	25.05	34.98	39.58	35.12	37.38	28.94
First decade	UCRB	17.30	11.79	18.96	20.21	17.40	12.58	9.04
Long-term	EEIS	37.69	27.00	35.36	38.19	36.00	36.71	29.36
Long-term	UCRB	18.37	11.77	18.92	20.41	18.51	13.85	10.27
Range - Wildfire								
First decade	EEIS	9.04	9.50	6.87	6.90	7.20	7.14	9.41
First decade	UCRB	10.11	9.67	7.02	7.03	8.47	8.27	12.57
Long-term	EEIS	10.83	15.26	7.39	7.26	7.96	7.65	10.40
Long-term	UCRB	11.79	13.01	7.20	7.16	9.22	8.53	12.75

[1]Qualitatively reduced in Alternative 2 due to an error in the simulation.

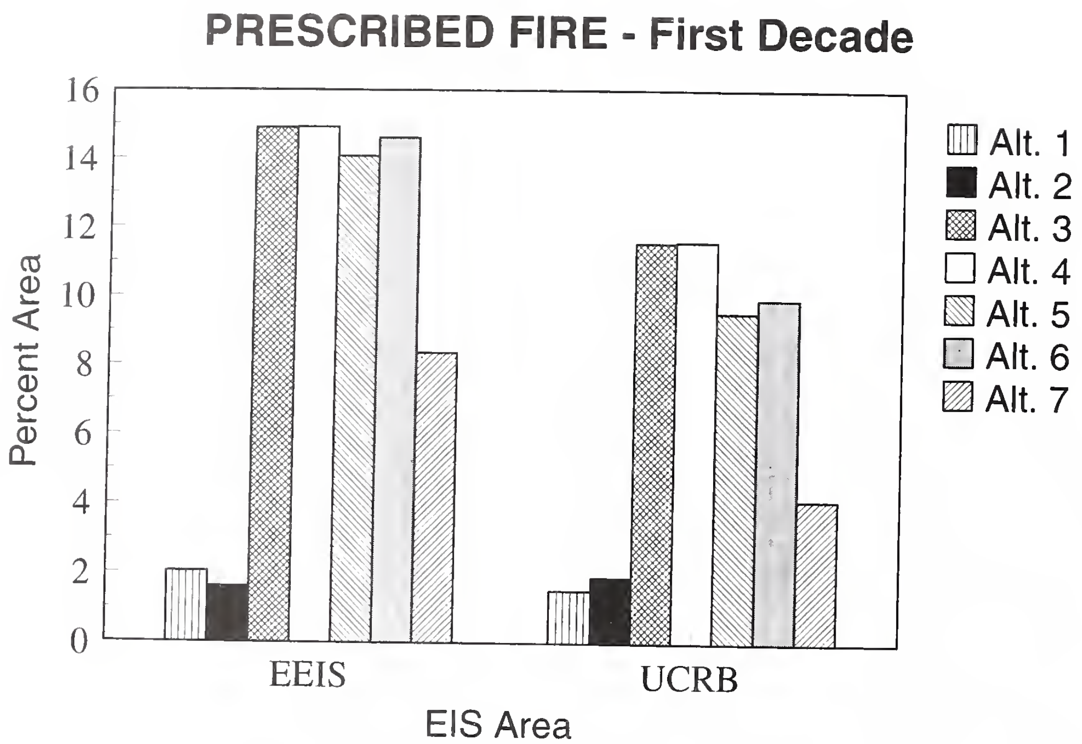


Figure 2.7 — Percent of BLM- and FS-administered lands disturbed by prescribed fire for all forest PVGs for years 1-10.

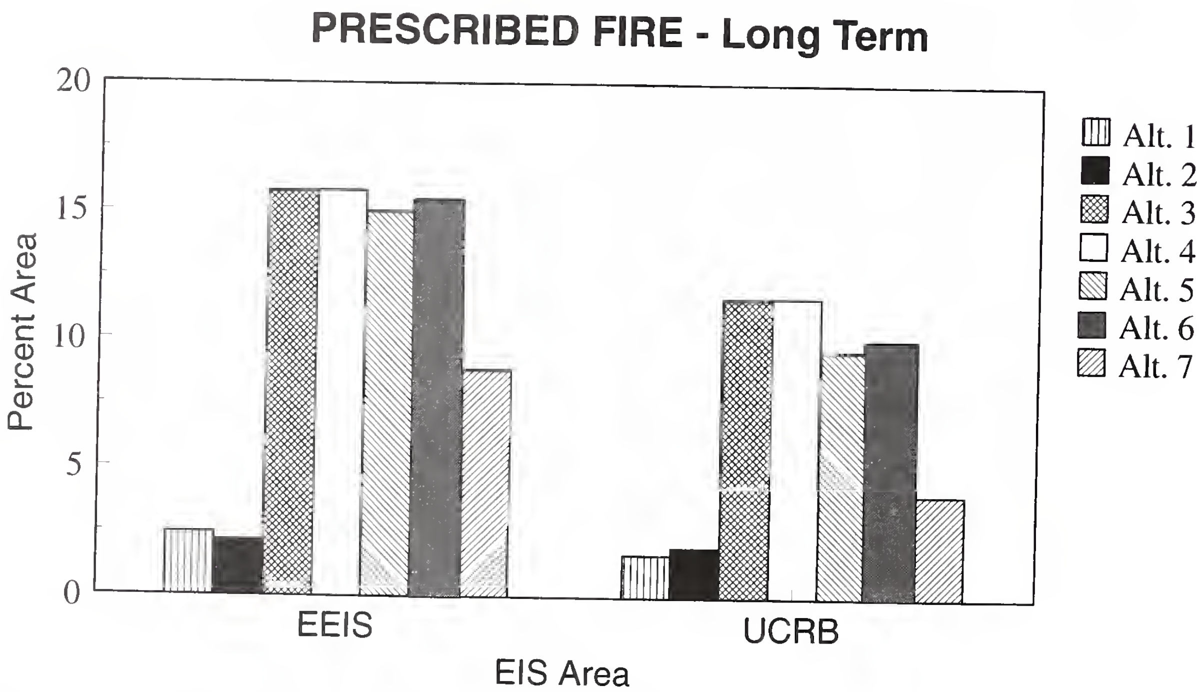


Figure 2.8 — Percent of BLM- and FS-administered lands disturbed by prescribed fire for all forest PVGs by decade over 100 years.

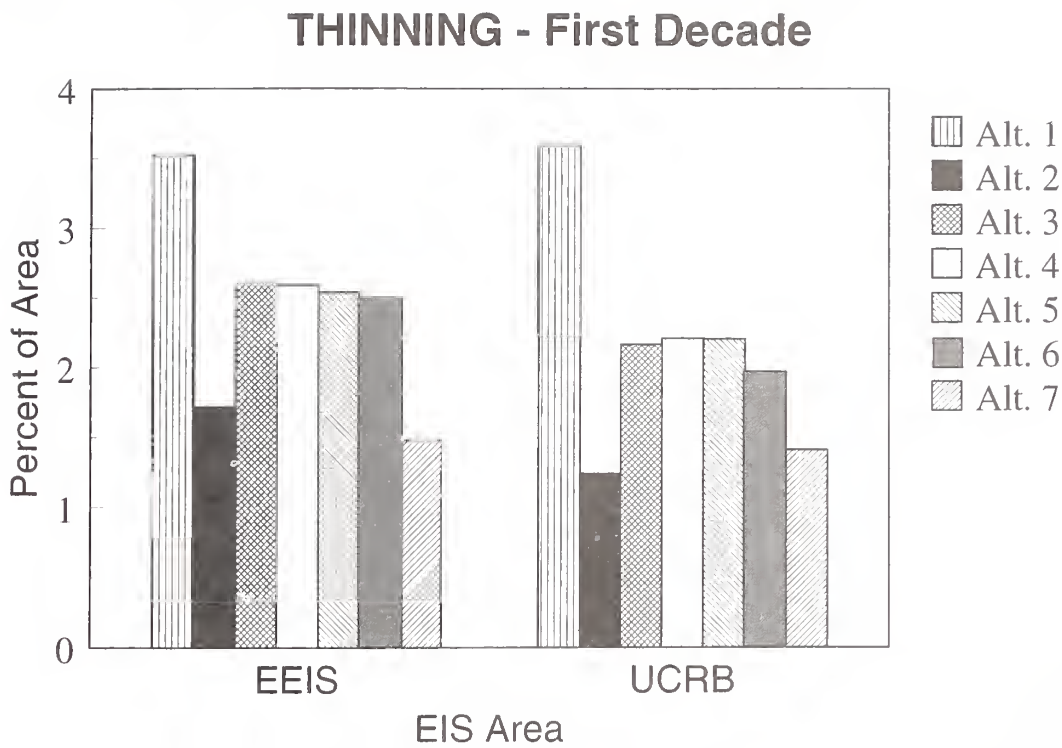


Figure 2.9 — Percent of BLM- and FS-administered lands disturbed by thinning for all forest PVGs for years 1-10.

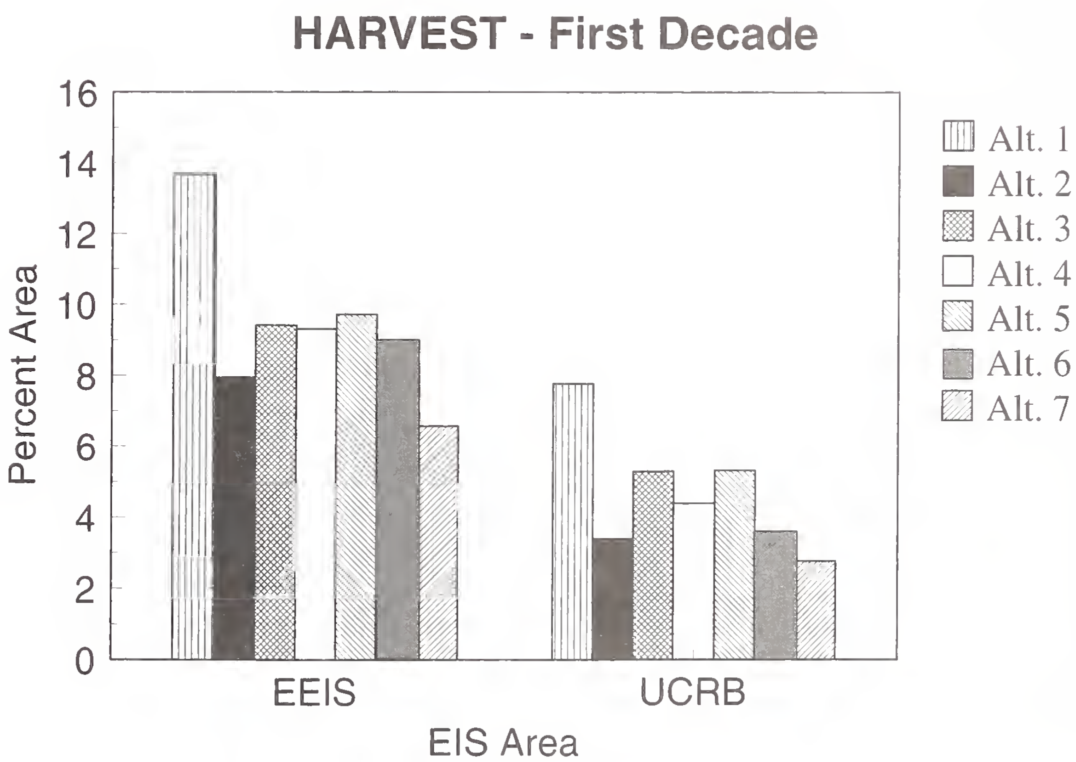


Figure 2.10 — Percent of BLM- and FS-administered lands disturbed by harvest for all forest PVGs for years 1-10.

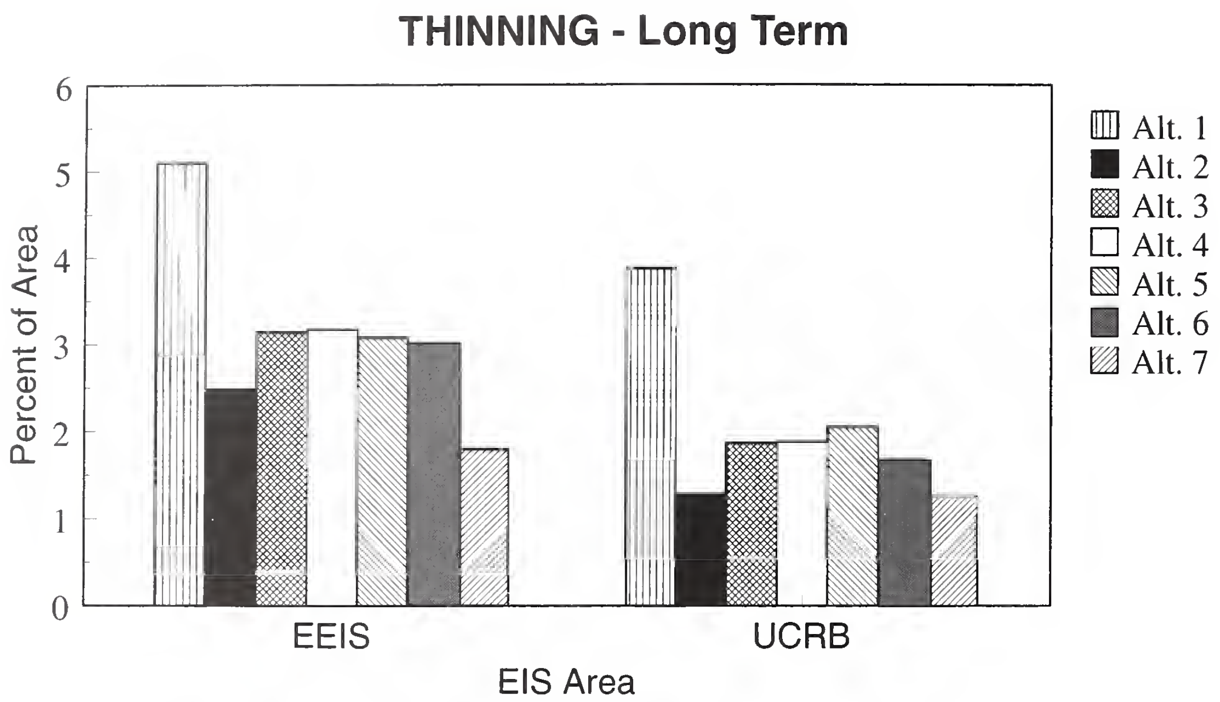


Figure 2.11 — Percent of BLM- and FS-administered lands disturbed by thinning for all forest PVGs by decade over 100 years.

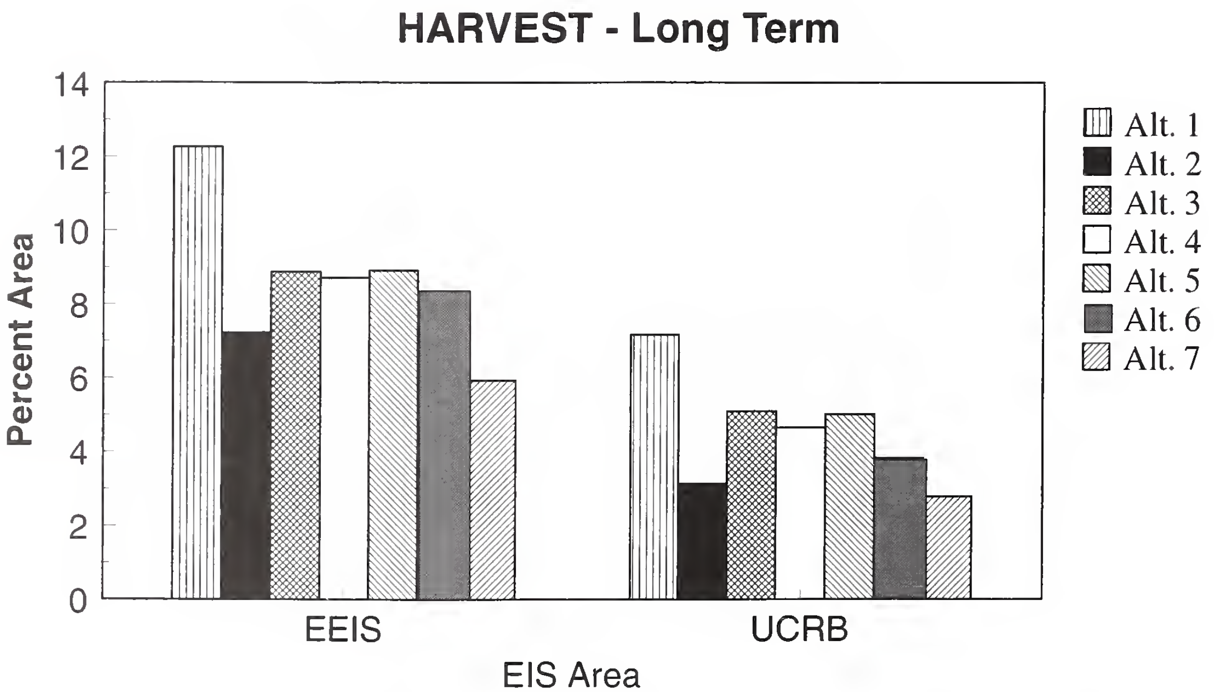


Figure 2.12 — Percent of BLM- and FS-administered lands disturbed by harvest for all forest PVGs by decade over 100 years.

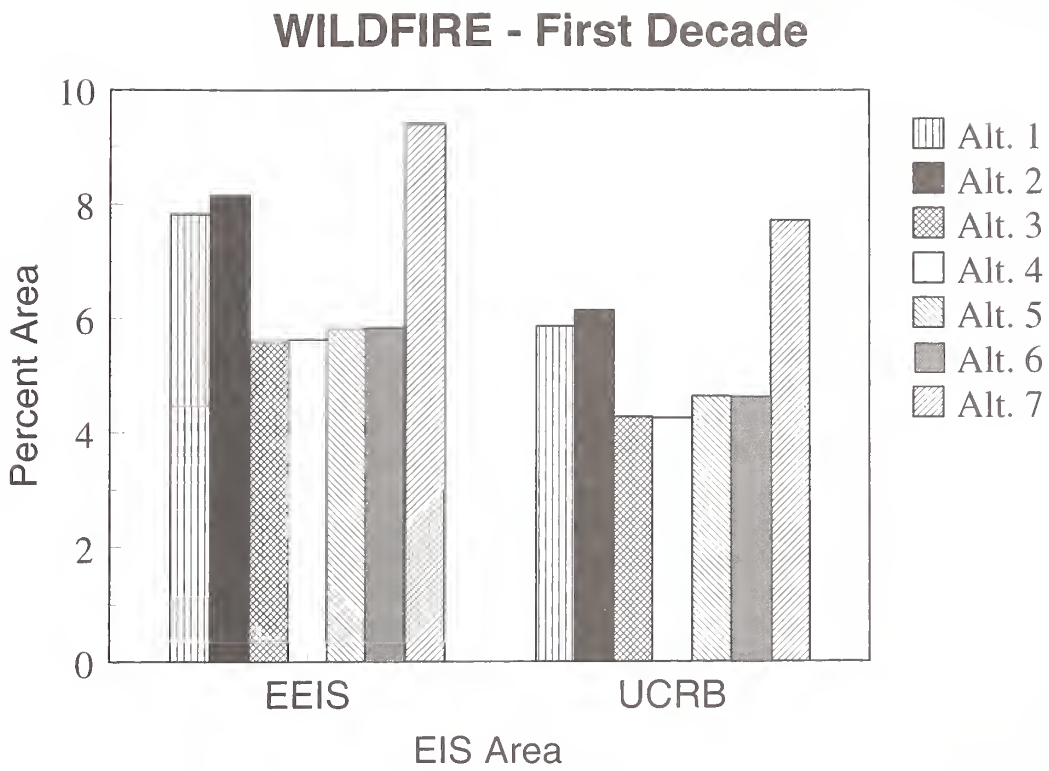


Figure 2.13 — Percent of BLM- and FS-administered lands disturbed by wildfire for all forest PVGs for years 1-10.

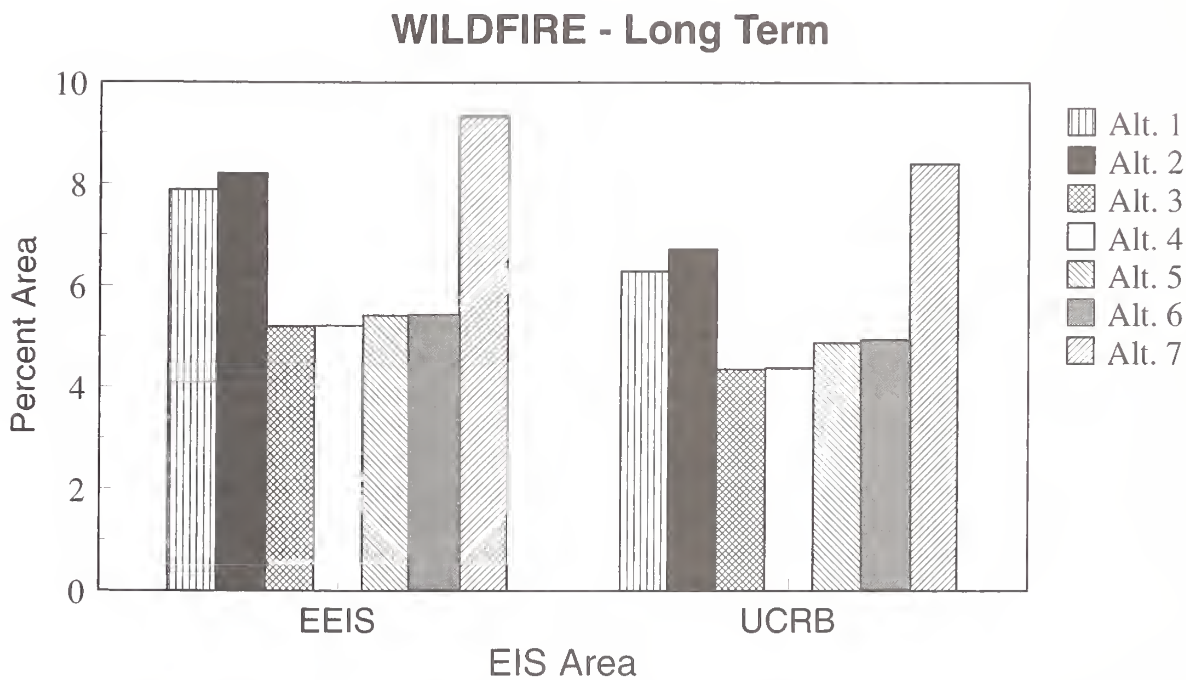


Figure 2.14 — Percent of BLM- and FS-administered lands disturbed by wildfire for all forest PVGs by decade over 100 years.

Forest Crown Wildfire — In the simulation, we modeled the differences in forest wildfires exhibiting crown fire behavior (table 2.16). For each alternative, we projected the average amount of net crown fire per decade for a 100-year period. The current amount of crown fire is well below the historical level due to wildfire suppression activities. Although the area of crown fire simulated by Alternatives 1 and 2 was not significantly different for BLM- and FS-administered lands, both alternatives were projected to have substantial increases compared to the current level due to continued development of high-risk fuel types and patterns.

The only other alternative with levels similar to the no action alternatives was Alternative 7, which would have a high probability of large wildfires with erratic behavior in the reserve areas. Alternatives 4, 3, 6, and 5, respectively, would have lower amounts of crown fire on BLM- and FS-administered lands in both EIS areas, as well as the Basin as a whole. Alternative 4 has substantially less crown fire than 5 and 6 in the UCRB but similar amounts in the EEIS area. Alternative 5 has somewhat higher levels of wildfire than 4, 3, and 6, respectively, but less than 7.

The results for Alternative 6 in the Upper Columbia River Basin EIS area are somewhat higher than expected from the activity levels stated in the preliminary draft EIS. This disparity could be corrected through more refined mapping of management prescriptions to high-risk subbasins, urban-rural/wildland interface areas and potential vegetation groups. Similarly, the amount in Alternative 4 could be reduced through further prioritization of high-risk subbasins, urban-rural/wildland interface areas, and potential vegetation groups. However, a key reason for the higher levels in Alternative 6 compared with Alternative 4 is the slower rate of activities during the first decade. Alternative 3 generally would have less crown fire than Alternative 5, because Alternative 3 has more emphasis on management of fuels in high-risk dry subbasins and potential vegetation groups. Response on Other lands was generally the same across all alternatives because of no assumed difference in the management of fuels and fire between alternatives on Other lands. However, the strategic reduction of crown fire risk in Alternative 4 would also result in an associated reduction of wildfire risk on adjacent lands of Other ownerships. In contrast, the lack of strategic reduction of crown fire risk in Alternatives 1, 2, 3, 5, and 7 and lower levels of restoration activities in Alternatives 6 and 7 would result in increased risks to adjacent lands in Other ownerships.

Forest Mortality Susceptibility — We modeled the net insect and disease mortality susceptibility in forests for the alternatives for 100 years (table 2.17). Currently, on BLM- and FS-administered lands, the potential tree mortality from insects and disease is nearly twice the historical levels. The shift to more insect- and disease-vulnerable forests is attributed to fire exclusion and past harvest practices (Hann and others, in press; Hessburg and others 1996).

For the Basin, the insect and disease potential of Alternatives 1 and 2 would have similar increases on BLM- and FS-administered lands relative to the current condition. In the Eastside EIS area, the increases would be substantial, at approximately 3 percent of the land area. However, the insect and disease susceptibility in the Upper Columbia River Basin EIS area would decrease as a result of Alternatives 1 and 2. This increase in the EEIS area and decrease in the UCRB EIS area is caused by differences in long-term response to pre-settlement disturbance and early and recent historical managements rather than by the alternatives. The relative differences between alternatives indicate the differences related to alternative management strategies. Although Alternative 4 would reduce the susceptibility more than all other alternatives for the Basin as a whole and for the two EIS areas, insect and disease mortality would still be well above historical levels. Alternative 6 would have the next lowest susceptibility, although its level would be very similar to Alternatives 3 and 5 for the Basin and both EIS areas. Alternative 7 would have a level slightly below the no action alternatives, but higher than Alternatives 3 through 6.

Table 2.16 — Net forest crown fire at year 100.[1]

Management Area	Ownership	Total Hectares	Historical	Current	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7
			Hectares of Disturbance								
EEIS	BLM/FS	11,768,500	42,500	29,900	38,400	38,600	15,200	13,500	16,400	14,100	35,600
EEIS	Other[3]	16,648,500	48,700	28,000	38,800	38,800	38,800	38,800	38,800	38,800	38,800
GYE[2]	BLM/FS	1,514,100	6,500	5,200	5,900	7,000	4,100	3,400	4,800	5,300	7,200
UCRB	BLM/FS	16,978,700	72,100	43,000	51,300	55,900	29,400	26,600	35,700	33,200	63,800
UCRB	Other[3]	11,555,600	38,300	20,100	28,200	28,200	28,200	28,200	28,200	28,200	28,200
Total BLM/FS		30,261,300	121,100	78,100	95,600	101,500	48,600	43,500	56,900	52,600	106,600
Total Other[3]		28,204,100	87,000	48,100	67,000	67,000	67,000	67,000	67,000	67,000	67,000
Total All		58,465,400	208,200	126,200	162,600	166,500	115,600	110,500	123,800	119,100	172,100
			Percent of EIS Ownership								
EEIS	BLM/FS		0.36	0.25	0.33	0.33	0.13	0.11	0.14	0.12	0.30
EEIS	Other[3]		0.29	0.17	0.23	0.23	0.23	0.23	0.23	0.23	0.23
GYE	BLM/FS		0.43	0.34	0.39	0.46	0.27	0.22	0.32	0.35	0.48
UCRB	BLM/FS		0.42	0.25	0.30	0.33	0.17	0.16	0.21	0.20	0.38
UCRB	Other[3]		0.33	0.17	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Total BLM/FS			0.40	0.26	0.32	0.34	0.16	0.14	0.19	0.17	0.35
Total Other[3]			0.31	0.17	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Total All			0.36	0.22	0.28	0.28	0.20	0.19	0.21	0.20	0.29

[1] Hectare = 2.47 acres; rounded to the nearest 100. Net infers the effect of mosaic pattern differences between alternatives.

[2] The Greater Yellowstone Ecosystem (GYE) area is not part of the decision for the UCRB EIS, but is included for completeness and cumulative effects within the Assessment area.

[3] Minor adjustments to Alternatives 2 (EEIS, UCRB, and Total), 6 (UCRB and Total), and 7 (EEIS, UCRB, and Total) modeled values for Other lands to correct errors in projections. Attempts to model differences in contagion effects of BLM and FS on Other lands did not successfully project differences.

Table 2.17 — Net forest insect and disease mortality susceptibility at year 100.[1]

Management Area	Ownership	Total Hectares	Historical	Current	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7
			Hectares of Disturbance								
EEIS	BLM/FS	11,768,500	957,700	1,900,100	2,204,000	2,289,500	1,560,000	1,368,800	1,559,500	1,425,800	1,885,200
EEIS	Other[3]	16,648,500	895,100	1,249,100	1,985,600	1,985,600	1,985,600	1,985,600	1,985,600	1,985,600	1,985,600
GYE[2]	BLM/FS	1,514,100	273,000	485,900	560,200	536,700	414,500	356,800	427,400	400,900	499,800
UCRB	BLM/FS	16,978,700	1,781,900	3,588,000	3,298,500	3,332,800	2,344,700	2,069,500	2,506,300	2,393,800	3,143,700
UCRB	Other[3]	11,555,600	827,400	1,400,600	1,618,600	1,618,600	1,618,600	1,618,600	1,618,600	1,618,600	1,618,600
Total BLM/FS		30,261,300	3,012,500	5,974,000	6,062,600	6,159,000	4,319,200	3,795,100	4,493,100	4,220,500	5,528,700
Total Other[3]		28,204,100	1,722,500	2,649,700	3,604,200	3,604,200	3,604,200	3,604,200	3,604,200	3,604,200	3,604,200
Total All		58,465,400	4,735,000	8,623,700	9,666,800	9,027,700	7,923,400	7,399,300	8,097,300	7,824,700	8,925,000
			Percent of EIS Ownership								
EEIS	BLM/FS		8.1	16.1	18.7	19.5	13.3	11.6	13.3	12.1	16.0
EEIS	Other[3]		5.4	7.5	11.9	11.9	11.9	11.9	11.9	11.9	11.9
GYE	BLM/FS		18.0	32.1	37.0	35.4	27.4	23.6	28.2	26.5	33.0
UCRB	BLM/FS		10.5	21.1	19.4	19.6	13.8	12.2	14.8	14.1	18.5
UCRB	Other[3]		7.2	12.1	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Total BLM/FS			10.0	19.7	20.0	20.4	14.3	12.5	14.8	13.9	18.3
Total Other[3]			6.1	9.4	12.8	12.8	12.8	12.8	12.8	12.8	12.8
Total All			8.1	14.8	16.5	15.4	13.6	12.7	13.9	13.4	15.3

[1]Hectare = 2.47 acres; rounded to the nearest 100. Net infers the effect of mosaic pattern differences between alternatives.

[2]The Greater Yellowstone Ecosystem (GYE) area is not part of the decision for the UCRB EIS, but is included for completeness and cumulative effects within the Assessment area.

[3]Minor adjustments to Alternatives 2 (EEIS, UCRB, and Total) and 7 (EEIS, UCRB, and Total) modeled values for Other lands to correct errors in projections. Attempts to model differences in contagion affects of BLM and FS on Other lands did not successfully project differences.

The insect and disease susceptibility of Alternative 4 may be higher than the preliminary draft EIS standards (appendix I), and the activity levels would indicate. However, the current cluster strategy lacks adequate spatial prioritization. This disparity could be corrected through a more refined mapping effort of prescriptions by high-risk subbasins and potential vegetation groups. The insect and disease response on Other lands was similar among alternatives, but there would be some contagion effects to Other lands. However, the strategic reduction of insect and disease risks in Alternative 4 would also result in an associated reduction of wildfire risk on adjacent lands of Other ownerships. In contrast, the lack of strategic reduction of insect and disease risk in Alternatives 1, 2, 3, 5 and 7 and lower levels of restoration activities in Alternatives 6 and 7 would result in increased risks to adjacent lands in other ownerships.

Forest Disturbance Summary — The total direct disturbances for wildfire, prescribed fire, thinning, and harvest varied among alternatives on BLM- and FS-administered lands (table 2.18). There was little simulated difference in disturbance among alternatives for Other lands because the alternatives only affected BLM- and FS-administered lands. However, there are some contagion effects relative to crown fire risk, insect and disease mortality, and harvest levels. The first decade and long-term average total direct disturbance areas for BLM- and FS-administered lands varied primarily between the no action (1 and 2), restoration (3-6), and reserve (7) alternatives. The areas of disturbance on BLM- and FS-administered lands of the no action Alternative 2 would be substantially below the HRV average, while Alternative 1 (also a no action alternative) would be only slightly below the HRV average. The disturbances resulting from Alternatives 3 through 6 would be similar to, or somewhat above, the historical average. Although the areas of disturbance resulting from Alternatives 7 and 1 would be similar, the dominant disturbance in Alternative 7 is wildfire, whereas timber harvest is the dominant disturbance in Alternative 1. The restoration alternatives that would be somewhat above HRV (Alternatives 3, 4, and 5) do not have activity levels high enough to shift the current trajectory toward HRV because of the lack of the high current departure across the Basin. Appendices 2D, 2E, 2F, 2G, 2H, and 2I provide more detailed first decade, long-term, ERU, PVG, and forest and range cluster group information.

Rangeland Disturbances

Prescribed Fire — The levels of prescribed fire in Alternatives 1 and 2 are low compared to the other alternatives (figures 2.15 and 2.16, table 2.15). These two alternatives would have a traditional type of treatments designed to increase forage quantity and quality, whereas the prescribed fire in Alternatives 3 through 6 would be

Table 2.18 — Percent of Basin forested and rangeland potential vegetation groups (PVGs) affected by decade by direct disturbance (wildfire, prescribed fire, thinning, harvest, seeding, exotic control) by alternative.

Vegetation Type	Ownership Class	Projection Years	HRV	Alternative						
				1	2	3	4	5	6	7
Forest	BLM/FS	First decade	21	18	13	24	23	22	22	18
Forest	BLM/FS	Long-term	21	18	14	24	24	23	22	18
Forest	Other	First decade	29	25	29	25	25	25	25	26
Forest	Other	Long-term	29	26	29	26	26	26	26	26
Range	BLM/FS	First decade	23	11	11	12	14	12	13	15
Range	BLM/FS	Long-term	23	12	15	10	10	11	11	14
Range	Other	First decade	33	15	15	15	15	15	16	15
Range	Other	Long-term	33	19	19	19	19	19	18	18

designed to mimic native fire processes and maintain native vegetation composition and structure. Alternatives 3 and 5 would have moderate levels of prescribed fire, Alternatives 4 and 6 would have relatively high levels, and Alternative 7 would have levels similar to Alternative 3 in the non-reserve areas and very little prescribed fire in the reserve areas.

Range Improvements and Plan Revision/ Implementation — The alternatives were evaluated for their level of range structural and non-structural improvements, and the revision and implementation of new range allotment plans (figures 2.17 and 2.18, table 2.15). Range improvements consisted of woodland cutting, forage seeding, and weed control. These activities occurred at low levels in Alternatives 1 and 2; moderate levels in Alternatives 3, 5, and 7; and relatively high levels in Alternatives 4 and 6, with the highest levels in Alternative 4. Range improvements were at very low amounts within the reserve areas of Alternative 7.

Grazing — Within both EIS areas, there would be more vegetation succession effects from grazing under Alternative 1 than under Alternatives 3 through 6. This is because Alternative 1 has less emphasis on proper livestock distribution and little emphasis on representing native herbivory patterns and processes. The effects of grazing in Alternative 2 would be similar to Alternative 1, except for less impact in riparian areas. Alternative 7 would have grazing levels similar to Alternative 3 in the non-reserve areas, but no livestock grazing in the reserves. Alternatives 4 and 6 would have grazing that best represents the native regime.

Total grazing effects for the first decade would range from a high in Alternative 4, to a low in Alternative 2 (figure 2.19). Total grazing effects over the long term (100 years) would range from a high for Alternatives 1 and 4, to a low for Alternative 2 (figure 2.20). We estimate that the historical grazing effect levels ranged from 20 to 40 percent, with only 2 percent of the area per year grazed at levels that would change successional pathways.

Grazing may not negatively affect ecosystem patterns and processes. The processes, composition, and structure of native ecosystems can be maintained if grazing is properly managed. For example, by substantially reducing fine fuels, grazing also reduces the associated probability of wildfire and subsequent invasion of exotics. Consequently, we conclude it is not the amount of grazing, but the type and timing of grazing that may cause departure in native composition and structure, or loss of riparian or upland soil capability. The alternatives mimic the native regime from closest fit to least fit in order of 6, 4, 3, 7, 5, 2, and 1.

Exotic Herbland — The levels of exotic herbland were predicted to be highest for Alternatives 1 and 2, lowest for Alternatives 3, 4, 5, and 6, and intermediate in Alternative 7 (figures 2.21 and 2.22, table 2.15). The amount of exotic herbland within the non-reserve areas of Alternative 7 was expected to be similar to Alternative 3. Predictability of amount in the reserve areas of Alternative 7 is poor because of multiple possible outcomes in response to erratic fire patterns, increase of big game and wild horses, and lack of restoration of currently disturbed areas.

Rangeland Wildfire — Alternatives 1 and 2 were expected to have relatively high levels of wildfire, and Alternative 4 much lower levels (figures 2.23 and 2.24, table 2.15). Alternatives 4 and 6 were predicted to have wildfire levels much lower than Alternative 1 and 2, and slightly less than Alternatives 3 and 5. The amount of wildfire expected in the non-reserve portions of Alternative 7 would be similar to Alternative 3, but quite high and with erratic behavior and effects inside the reserves.

Within the reserves, areas characterized as dry grass and dry shrub would be most affected by the severe effects of wildfires. The cool shrub and riparian potential vegetation groups would be less likely to have severe fire effects. Wildfire behavior in the reserves in Alternative 7 would be much more erratic than for other alternatives. Consequently, the fire effects in the reserves would be less predictable than for the other alternatives.

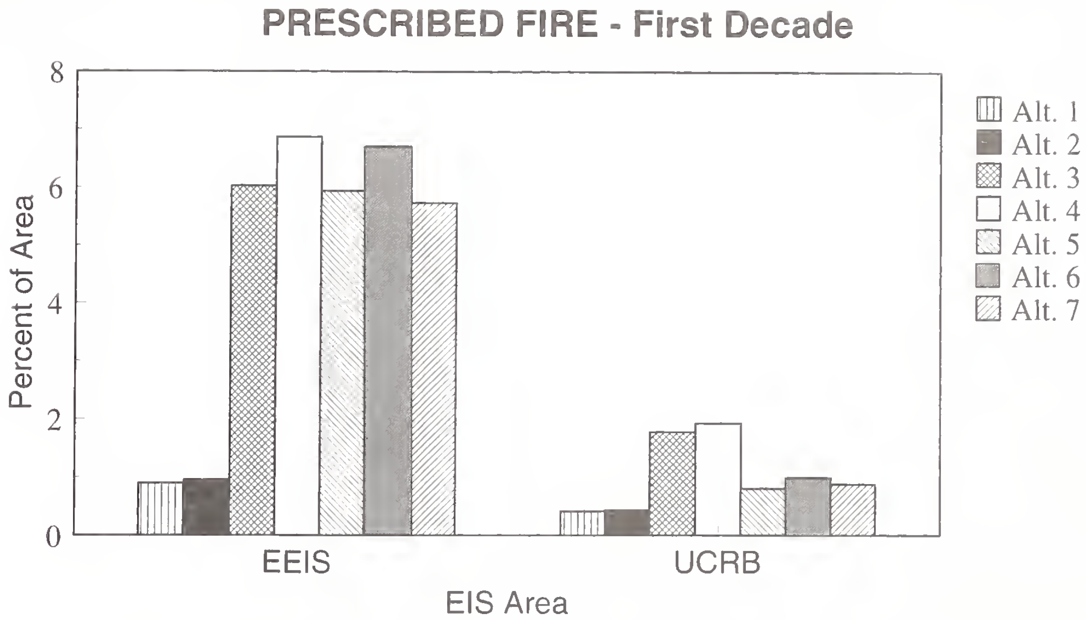


Figure 2.15 — Percent of BLM- and FS-administered lands disturbed by prescribed fire for all rangeland and riparian PVGs for years 1-10.

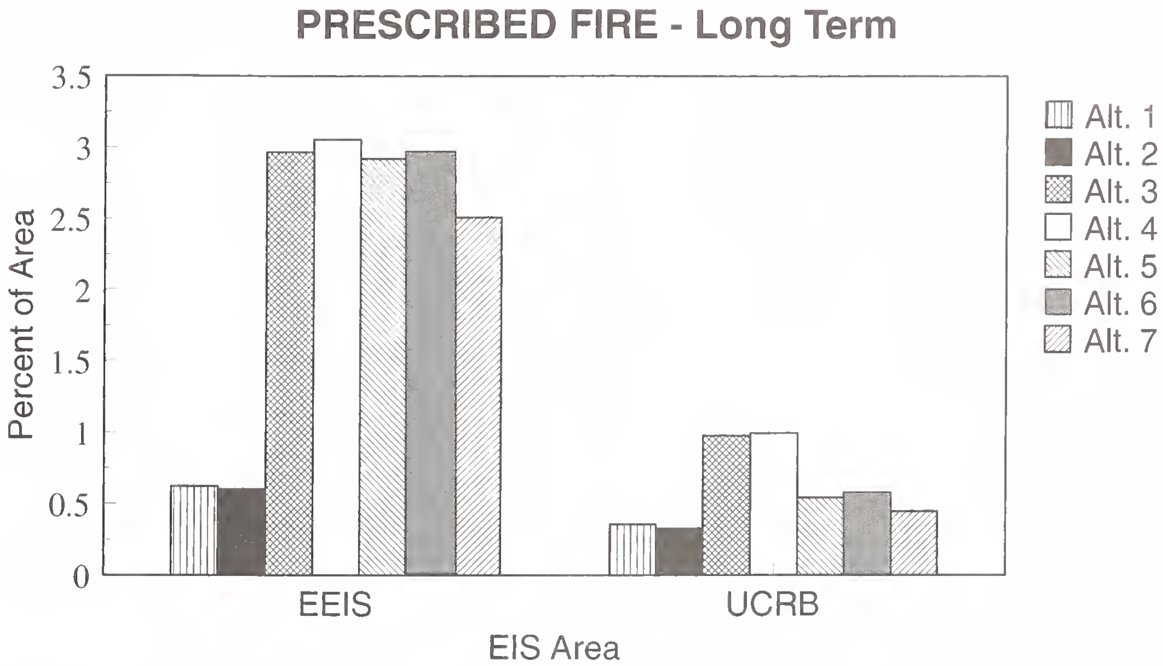


Figure 2.16 — Percent of BLM- and FS-administered lands disturbed by prescribed fire for all rangeland and riparian PVGs by decade over 100 years.

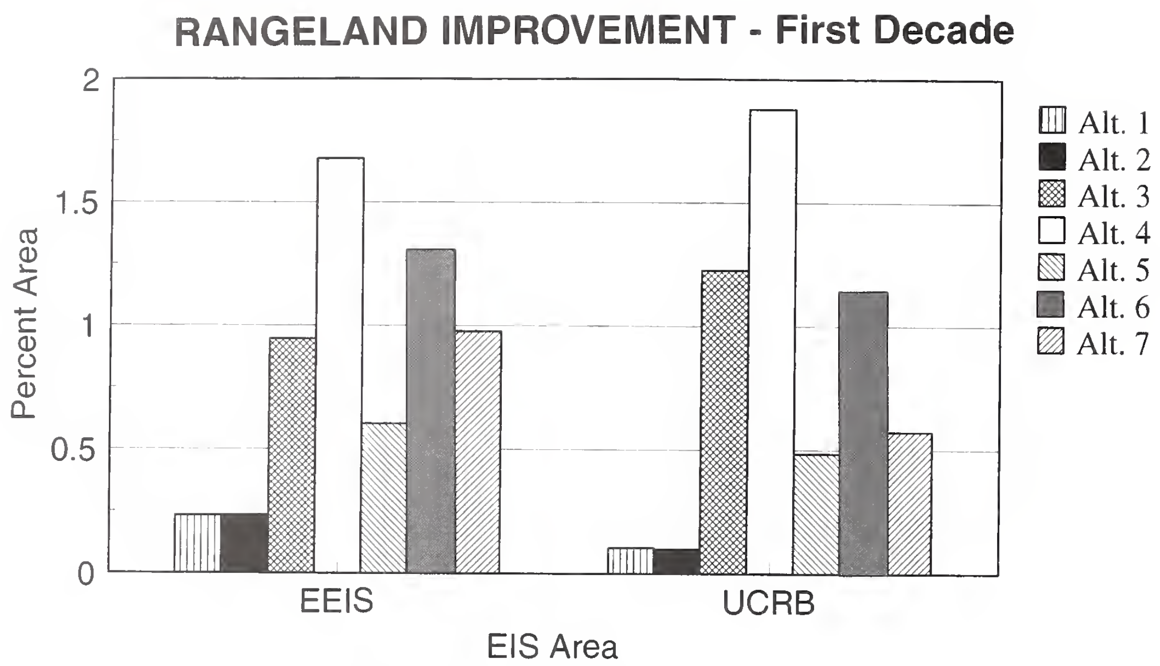


Figure 2.17 — Percent of BLM- and FS-administered lands disturbed by nonstructural rangeland improvement for all rangeland and riparian PVGs for years 1-10.

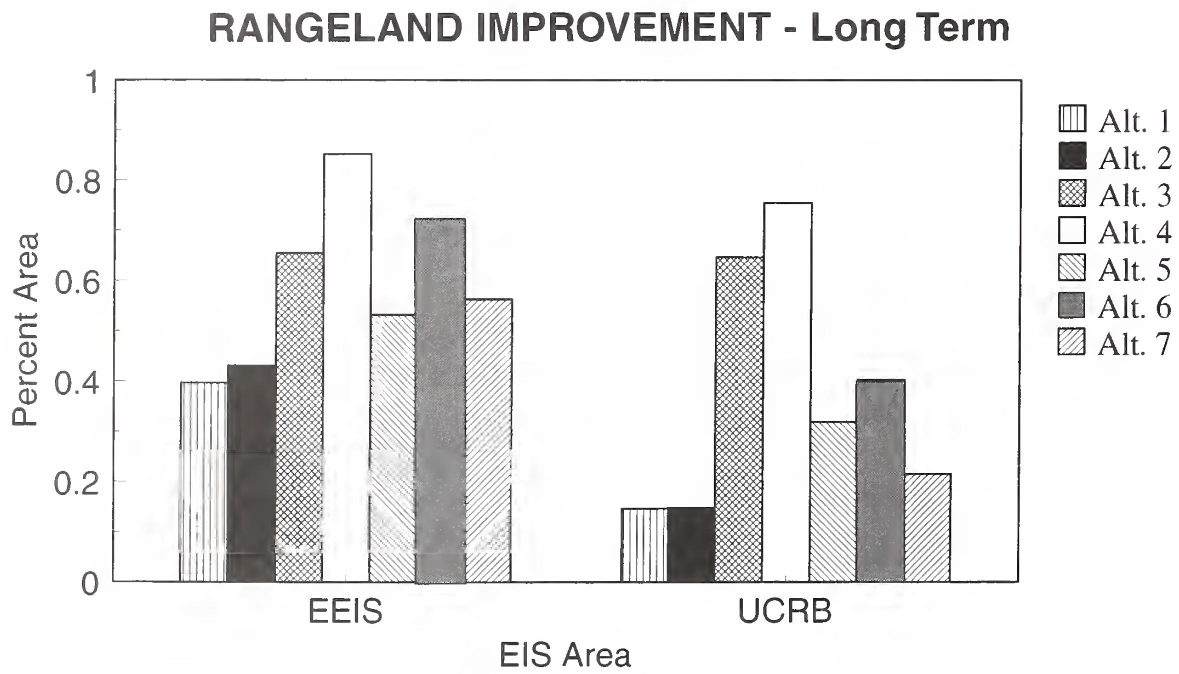


Figure 2.18 — Percent of BLM- and FS-administered lands disturbed by nonstructural rangeland improvement for all rangeland and riparian PVGs by decade over 100 years.

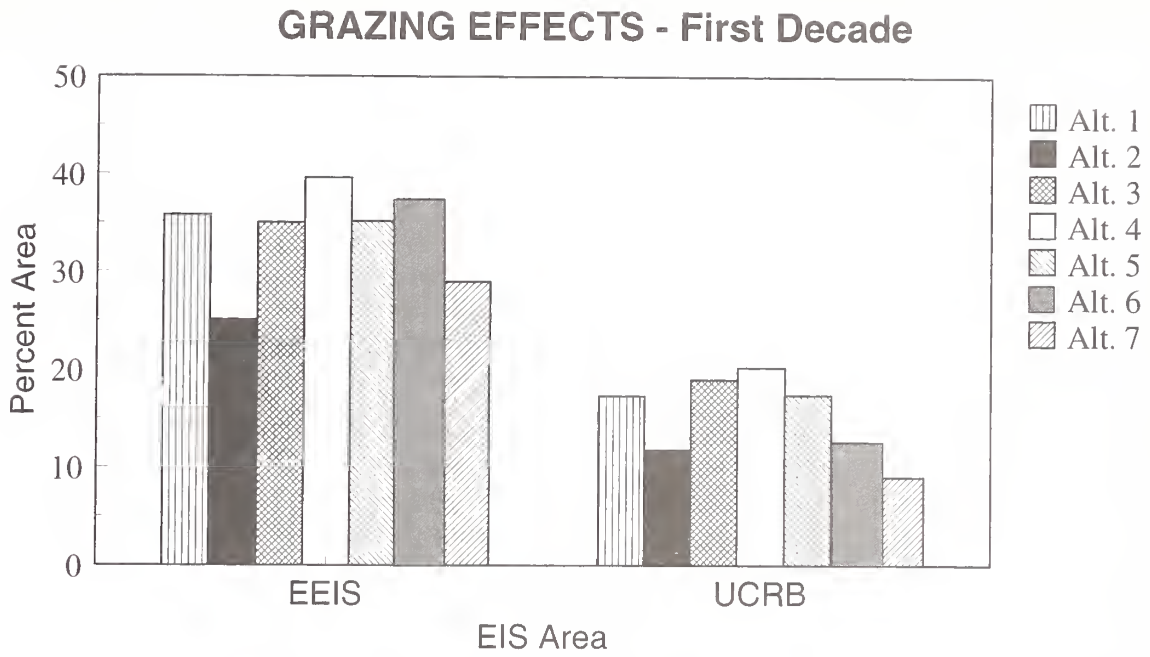


Figure 2.19 — Percent of BLM- and FS-administered lands disturbed by grazing effects for all rangeland and riparian PVGs for years 1-10.

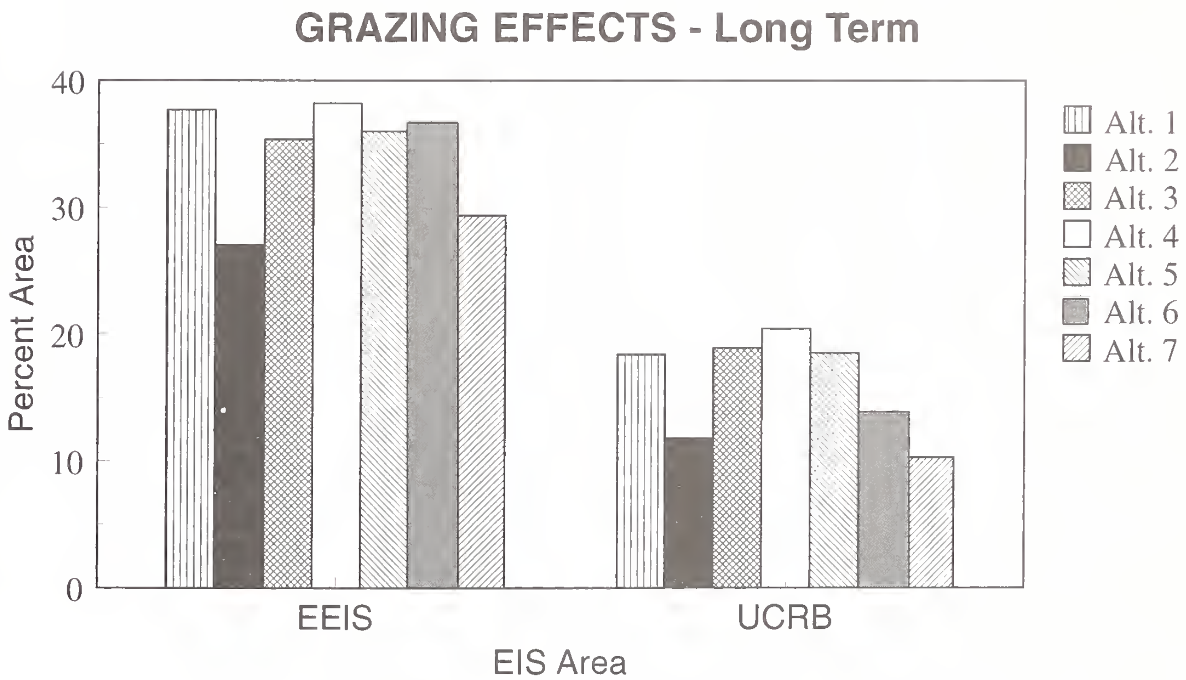


Figure 2.20 — Percent of BLM- and FS-administered lands disturbed by grazing effects for all rangeland and riparian PVGs by decade over the 100 years.

Rangeland Disturbance Summary — The effects of grazing relate to the ability of management to mimic ecosystem processes and to maintain native vegetation composition and structure. The effects would vary by alternative, depending on:

- Amounts of grazing, wildfire, and exotics relative to the amount of improvements and restoration of rangeland vegetation and livestock distribution.
- Amount of prescribed fire.
- Intensity of revising and implementing rangeland allotment plans.

Direct rangeland disturbances, including vegetation improvements, prescribed fire, and wildfire, that were projected for the first decade would affect from 10 to 15 percent of the area per decade, with Alternatives 1 and 2 disturbing the least area, and Alternative 7 disturbing the most area. Rangeland disturbance projections for Alternatives 3, 4, 5 and 6 for the two EIS areas were similar. The HRV average is almost twice this level. However, given the use of grazing to represent herbivory and reduction of fine fuels in Alternatives 3, 4, and 6, this level is probably appropriate. Disturbance patterns have high departure from the native regimes in Alternatives 1 and 2 and moderate departure in Alternatives 5 and 7.

Landscape Scale Disturbances

Total Direct Disturbance — An evaluation of total direct disturbance across all landscapes provides an indicator when compared to the average disturbance for the 400-year simulation (table 2.18). Total disturbance includes prescribed fire, wildfire, timber harvest and thinning on both forests and rangelands. These disturbances were assumed to represent disturbances similar to the native regime in Alternatives 3 through 6. Grazing effects were not included in Alternatives 3 through 7 because they were assumed to mimic native grazing and not cause direct change.

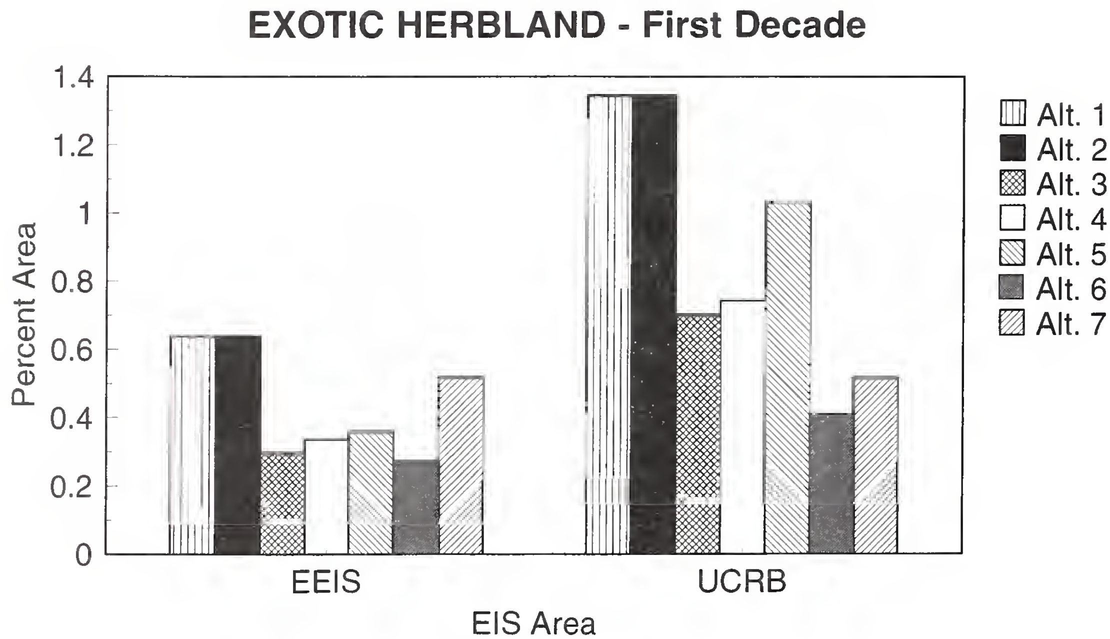


Figure 2.21 — Percent of BLM- and FS-administered lands disturbed by exotics for all rangeland and riparian PVGs for years 1-10. Exotics in Alternative 2 were simulated at too high a level, so they have been adjusted to be similar with Alternative 1.

Alternatives 1 and 2 are considerably less than the average total direct disturbance on BLM- and FS-administered land because of low levels of prescribed fire and high emphasis on wildfire suppression. Alternative 2 is less than Alternative 1 because of lower harvest in riparian buffer areas and in the late-seral forest. On Other ownerships the amount of harvest increases in Alternative 2 compared to Alternative 1 because of reduced timber availability on public lands. Alternative 7 is similar in total amount to Alternative 1 on BLM- and FS-administered land because of reduced amounts of timber harvest and prescribed fire, but higher amounts of wildfire. Alternatives 3, 4, 5, and 6 all had similar levels of total disturbance; their differences were primarily related to spatial location by subbasin and type of disturbance.

Wildfire — The projected levels of wildfire among alternatives differed primarily between the no action alternatives (1 and 2), the restoration alternatives (3 through 6), and the reserve alternative (7). The restoration alternatives would result in approximately a 20 percent reduction in wildfires compared to the no action alternatives in the first decade and in the long term (table 2.15 and figures 2.13, 2.14, 2.23, and 2.24). There were minor differences between Alternatives 3 through 6 in the first decade, but differences were more pronounced in the long term. In general, Alternatives 3 and 4 would have somewhat less wildfire than Alternatives 5 and 6, but for different reasons. Alternative 3, due to its local emphasis, would have higher levels of traditional fire suppression in combination with some restoration, while Alternative 4 would place more emphasis on proactive restoration. Alternative 5 would have higher wildfire due to higher risk in the low production areas. This would occur because restoration and production projects would be prioritized to the moist forest and productive range subbasins, with

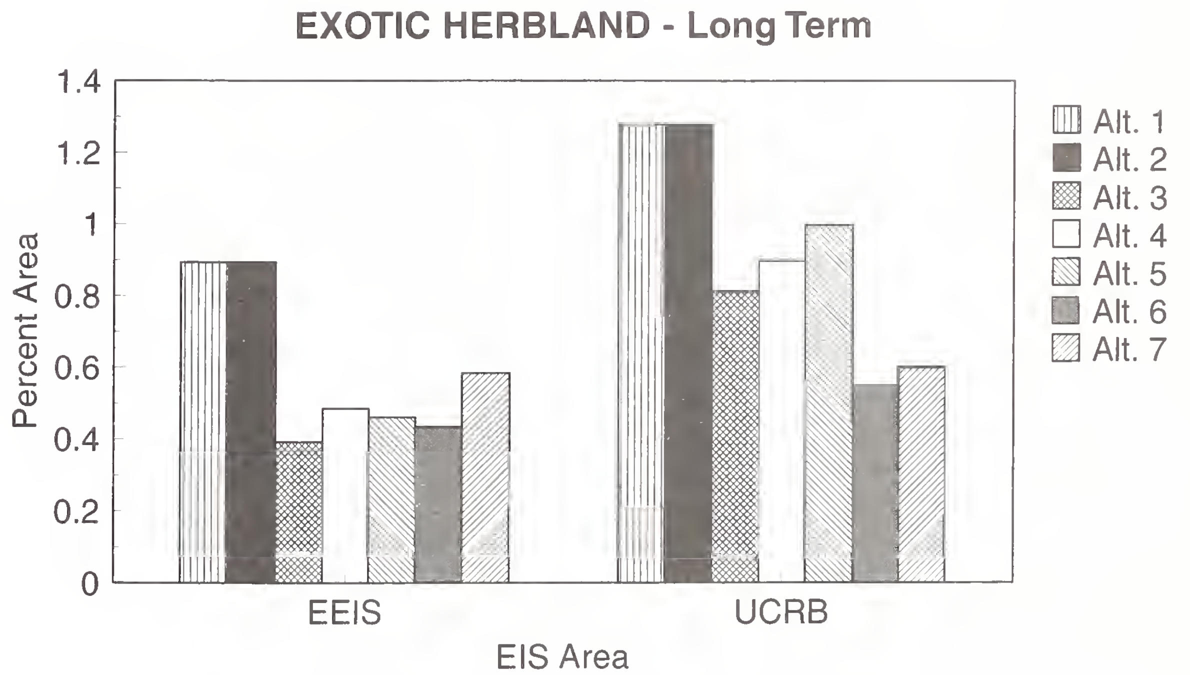


Figure 2.22 — Percent of BLM- and FS-administered lands disturbed by exotics for all range and riparian PVGs by decade over 100 years. Exotics in Alternative 2 were simulated at too high a level, so they have been adjusted to be similar with Alternative 1.

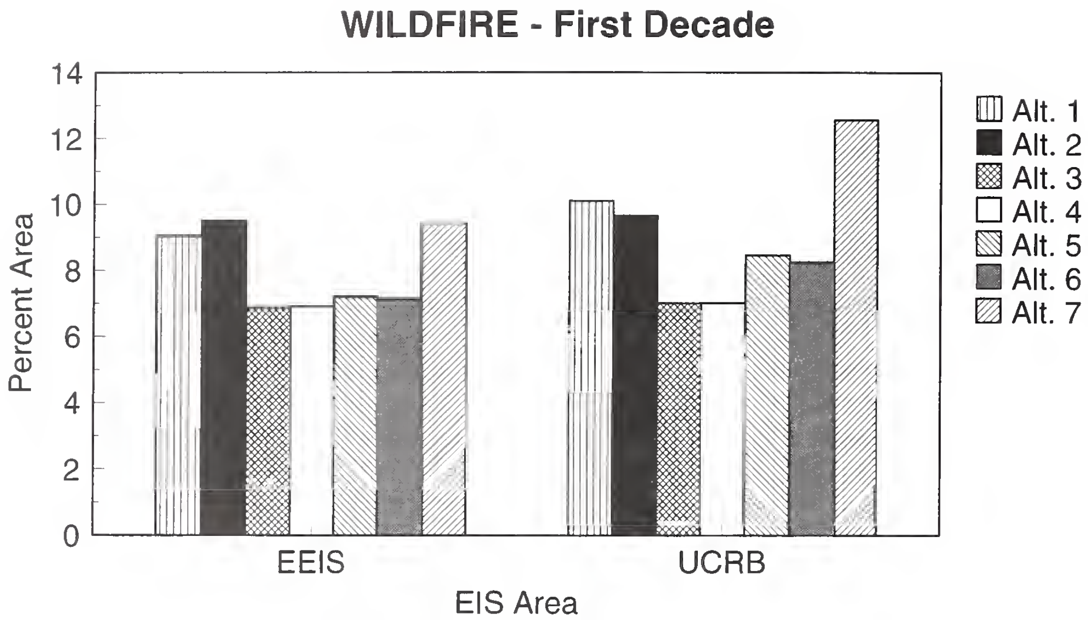


Figure 2.23 — Percent of BLM- and FS-administered lands disturbed by wildfire for all rangeland and riparian PVGs for years 1-

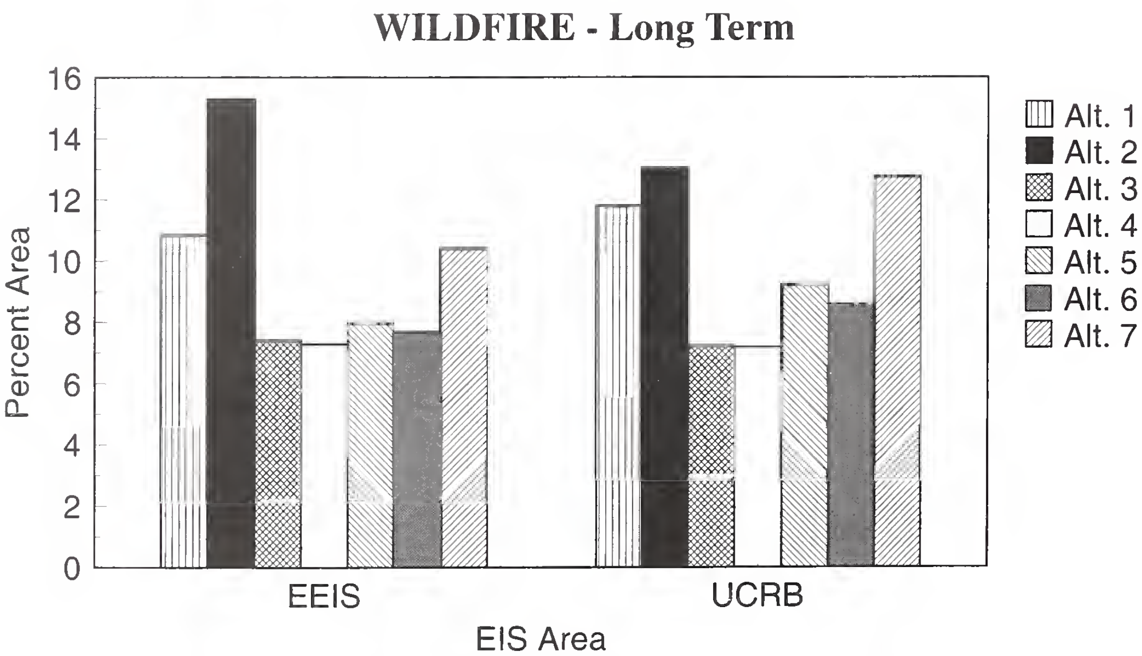


Figure 2.24 — Percent of BLM- and FS-administered lands disturbed by wildfire for all rangeland and riparian PVGs by decade over 100 years.

low proactive restoration in the dry forest and range subbasins. Alternative 6 would have higher wildfire related to lower levels of restoration activities compared to Alternative 4. Particularly, the low levels of restoration in the first decade predispose Alternative 6 to higher risks in the long term. Wildfire levels could be substantially reduced in Alternatives 4 and 6 through more refined spatial and temporal prioritization of high-risk subbasins and subwatersheds, potential vegetation groups, and the urban-rural/wildland interface area. This refinement would generally not be possible in the other alternatives since their themes and standards do not emphasize Basin-wide restoration and reduction of fire risk.

Soil Disturbances — Total soil disturbance was modeled as a summary characteristic for comparing alternatives (Hann and others 1997). Values modeled were the combined soil disturbances for the BLM- and FS-administered lands (table 2.19). The Other lands were not summarized since alternatives did not influence them. For the Basin, the highest levels of cumulative soil disturbance would be produced in Alternatives 1 and 2, the no action alternatives. The least amount of disturbance would be produced in Alternatives 4, 6, and 7, which had little difference among them. Alternative 5 would produce the most disturbance of Alternatives 3 through 7, and Alternative 3 slightly less than Alternative 5. These trends would be similar for both EIS areas.

Ability to Mimic Native Composition and Structure — We evaluated the alternatives by comparing their general ability to mimic or represent native ecological processes. The long-term simulation of HRV wildfire provided a basis for this comparison. The total change of direct forest and rangeland disturbance was compared between the HRV and alternative simulations. Harvest and wildfire were generally assumed to be equivalent to lethal crown fire, and thinning and prescribed fire were generally assumed to be equivalent to mixed and nonlethal fires. Grazing effects, invasion by and control of exotics, rangeland restoration, and range allotment plan revisions/implementation were also evaluated.

Alternatives 1 and 2 would emphasize traditional treatments that do not attempt to mimic the types of fire regimes, herbivory patterns, and other effects that are consistent with the biophysical regime and inherent disturbance processes. Alternatives 4 and 6 have the strongest direction and potential for implementing ecological treatments that mimic native processes. Given the complex nature of these regimes and the emphasis

Table 2.19 — Forest and rangeland soil disturbance summary by preliminary draft EIS alternatives for BLM- and FS-administered lands.

	Hectares[1] of Disturbance by Alternative						
EIS Area[2]	1	2	3	4	5	6	7
EEIS	3,150,800	2,973,100	2,412,000	2,297,000	2,562,700	2,334,200	2,351,500
GYE	59,800	43,200	47,000	46,200	47,700	38,900	38,900
UCRB	2,225,100	1,948,100	1,692,400	1,663,400	1,993,800	1,652,800	1,692,000
Assessment[3] Area Total	5,435,704	4,964,400	4,151,400	4,006,600	4,604,200	4,025,900	4,082,400

[1]Hectare = 2.47 acres; rounded to nearest 100.

[2]EEIS = Eastside EIS area.
GYE = Greater Yellowstone Ecosystem area (not part of decision for EEIS/UCRB, but included for completeness and cumulative effects within Assessment area).
UCRB = Upper Columbia River Basin area.

[3]Total includes soil disturbance associated with: harvest, thinning, wildfire, prescribed fire, grazing, exotics, and range improvements. Total may sum to more than the EIS area due to overlap of disturbance types. All data should be displayed as relative values among alternatives.

of Alternative 6 on technology development and transfer, we believe that Alternative 6 would most closely mimic or represent native effects at a project level. Alternative 4 would have higher activity levels, and thus more closely mimic or represent native processes in terms of total disturbance at a landscape scale. Alternatives 1 and 2 would have the least ability to mimic the native regime, while Alternatives 3, 5, and 7 would have intermediate levels.

Although the effects of Alternatives 4 and 6 would be similar, Alternative 4 would have a more rapid rate of implementation and, consequently, increased potential for error at mid- and fine-scales on sensitive sites. However, the slower implementation rate of Alternative 6 leads to higher potential for wildfire and invasion of exotics. Alternative 3 would have potential to diverge considerably from the native regime because of its emphasis on local priorities and its minimal change from the current forest and resource plans. Alternative 5 would also diverge considerably from the natural regimes due to its emphasis on economic efficiency and more production types. Alternative 7 would vary according to reserve/non-reserve allocations, with its non-reserve areas similar to Alternative 3 and its reserve areas tending toward large, erratic fires that do not mimic the native regime.

Additional detail about fire behavior, patterns, and effects is presented in this chapter in the section on evaluation of vegetation response and disturbance patterns.

Spatial Distribution of Disturbances — For evaluation purposes, we aggregated forest and range clusters into five groups [F, J, L, M, and H (map 2.22 and table 2.14)][2] based upon their composition of potential vegetation type groups, ownership, amounts of wilderness, forest and rangeland integrity, fire risk, and urban/wildland interface (table 2.14).

The Eastside EIS area:

- Was dominated by group L.
- Had a small amount of group M.
- Had a moderate amount of group F.
- Had small amounts of groups J and H.

The Upper Columbia River Basin EIS area:

- Was dominated by groups M and H.
- Had a moderate amount of groups F and J.
- Had a relatively small amount of group L.

Forest disturbances were separated into four groups: prescribed fire, thinning, harvest, and wildfire (table 2.20). The amount of each type of disturbance varied, by alternative, in terms of its spatial allocation to the subbasin groups. Alternatives 1 and 2 would have activities relatively evenly distributed considering the size of each group. However, the wilderness prescribed natural fire program in subbasin group H in Alternative 2 would be considerably higher than in Alternative 1. Differences among Alternatives 3 through 7 are very apparent when looking at the spatial allocation of activities across the forest and range cluster groups. Relative to restoration, Alternatives 4 and 6 would generally place the highest mix of activities in the areas with the lowest integrity. Those areas would tend to be concentrated in groups L and J for the Eastside EIS; and in M, F, and J for the Upper Columbia River Basin EIS. For the Eastside EIS, the harvest, thinning, and prescribed fire disturbances would be concentrated spatially and temporally in areas J and L, where there is a high risk in the urban/wildland interface involving BLM- and FS-administered lands. Harvest, thinning, and prescribed fire disturbances for the Upper Columbia River Basin would be concentrated spatially and temporally in areas F, J, and M; these areas have a high risk in the urban/wildland interface involving BLM- and FS-administered lands.

[2]Group F: high urban/wildland interface, low integrity, moderate-high fire risk. Group J: high urban/wildland interface, moderate integrity, moderate fire risk. Group L: moderate urban/wildland interface, low integrity, high fire risk. Group M: low urban/wildland interface, low-moderate integrity, moderate fire risk. Group H: low urban/wildland interface, high integrity, moderate fire risk.

Table 2.20 — Percent of average yearly disturbance hectares for BLM- and FS-administered lands for the long-term by forest and range cluster group.

Disturbance	Cluster Group	Alternative						
		1	2	3	4	5	6	7
Forest-Harvest	H	0.16	0.09	0.19	0.20	0.14	0.17	0.06
Forest-Harvest	J	0.10	0.10	0.09	0.09	0.09	0.08	0.10
Forest-Harvest	L	0.38	0.43	0.37	0.39	0.38	0.42	0.50
Forest-Harvest	M	0.28	0.33	0.29	0.24	0.31	0.25	0.29
Forest-Harvest	F	0.08	0.05	0.06	0.08	0.09	0.07	0.05
Forest-Prescribed Fire	F	0.07	0.07	0.07	0.07	0.09	0.05	0.02
Forest-Prescribed Fire	H	0.42	0.46	0.36	0.36	0.31	0.31	0.08
Forest-Prescribed Fire	J	0.07	0.08	0.08	0.08	0.09	0.08	0.11
Forest-Prescribed Fire	L	0.32	0.26	0.31	0.31	0.35	0.34	0.52
Forest-Prescribed Fire	M	0.12	0.13	0.19	0.19	0.17	0.21	0.26
Forest-Thinning	J	0.11	0.10	0.10	0.10	0.10	0.10	0.11
Forest-Thinning	F	0.09	0.05	0.07	0.09	0.09	0.07	0.05
Forest-Thinning	M	0.34	0.37	0.34	0.33	0.37	0.34	0.37
Forest-Thinning	H	0.16	0.11	0.17	0.17	0.13	0.16	0.07
Forest-Thinning	L	0.31	0.38	0.32	0.32	0.31	0.33	0.40
Forest-Wildfire	F	0.08	0.08	0.08	0.07	0.06	0.09	0.07
Forest-Wildfire	H	0.41	0.42	0.40	0.40	0.45	0.43	0.52
Forest-Wildfire	J	0.09	0.09	0.09	0.09	0.08	0.08	0.08
Forest-Wildfire	L	0.25	0.24	0.24	0.24	0.22	0.22	0.17
Forest-Wildfire	M	0.18	0.18	0.19	0.20	0.19	0.18	0.15
Range-Exotics	H	0.10	0.02	0.19	0.16	0.16	0.15	0.09
Range-Exotics	J	0.01	0.00	0.02	0.02	0.01	0.02	0.01
Range-Exotics	L	0.46	0.68	0.33	0.38	0.27	0.52	0.44
Range-Exotics	M	0.31	0.27	0.35	0.31	0.43	0.16	0.35
Range-Exotics	F	0.11	0.04	0.12	0.13	0.12	0.16	0.12
Range-Grazing	H	0.07	0.05	0.08	0.07	0.07	0.04	0.04
Range-Grazing	F	0.04	0.04	0.04	0.05	0.04	0.05	0.05
Range-Grazing	J	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Range-Grazing	L	0.57	0.58	0.55	0.58	0.55	0.66	0.65
Range-Grazing	M	0.32	0.32	0.32	0.29	0.32	0.24	0.25
Range-Prescribed Fire	J	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Range-Prescribed Fire	L	0.48	0.50	0.52	0.52	0.60	0.59	0.60
Range-Prescribed Fire	M	0.26	0.23	0.19	0.19	0.11	0.11	0.07
Range-Prescribed Fire	F	0.20	0.25	0.25	0.25	0.28	0.28	0.33
Range-Prescribed Fire	H	0.05	0.02	0.03	0.03	0.01	0.01	0.01
Range-Wildfire	M	0.31	0.30	0.32	0.33	0.39	0.38	0.33
Range-Wildfire	J	0.01	0.00	0.00	0.00	0.00	0.00	0.01
Range-Wildfire	L	0.50	0.57	0.50	0.50	0.42	0.45	0.40
Range-Wildfire	H	0.09	0.06	0.09	0.09	0.10	0.09	0.16
Range-Wildfire	F	0.09	0.07	0.08	0.08	0.08	0.08	0.11
Rangeland Improvement	M	0.21	0.22	0.36	0.29	0.12	0.08	0.06
Rangeland Improvement	L	0.54	0.57	0.46	0.54	0.72	0.77	0.78
Rangeland Improvement	J	0.00	0.00	0.01	0.01	0.01	0.01	0.00
Rangeland Improvement	H	0.03	0.03	0.08	0.06	0.03	0.03	0.00
Rangeland Improvement	F	0.21	0.18	0.09	0.10	0.12	0.12	0.15

Alternative 3, which places more emphasis on local prioritization and minimal consideration on Forest and Resource plans, would have less concentrated activities than Alternatives 4 and 6. Alternative 5, which emphasizes restoration and production on the more productive lands, would focus activities more in groups L and M in the Eastside EIS area, and groups M and H in the Upper Columbia River Basin EIS area. Alternative 7, which has fewer activities due to its reserve areas, would have management disturbances distributed similar to Alternative 3 for the non-reserve areas.

Alternative Management Activity Levels

There is considerable difference among alternatives regarding the flexibility in the amounts of management activity levels that would produce the same desired effects relative to landscape patterns, processes, and associated soil disturbances described in the theme, DFCs, and standards. The more consistent an alternative's trajectory is with biophysical limitations and inherent disturbance processes, the greater the probability that planned and unplanned disturbances are consistent with the patterns and processes in which native aquatic and terrestrial species have evolved (Hann and others, in press). This leads to greater flexibility in the management of disturbance. There are several key points related to this consistency:

- Alternatives that are more consistent with the biophysical regime and inherent disturbance processes provide higher predictability of cause-and-effect relationships to other variables (such as erosion and sediment delivery, wildfire, or timber harvest) that affect aquatic, terrestrial, social, and economic conditions. Consequently, hierarchical analysis of landscape dynamics and associated effects on aquatic, terrestrial, social, and economic conditions provides a context and template that can improve the confidence in analysis. This has the potential to reduce the cost of analysis and associated monitoring and inventory.

- Alternatives that are more consistent with the biophysical regime and inherent disturbance processes have lower probabilities for unexpected events. This in turn leads to higher probabilities of achieving the alternative theme, desired future condition, standards, and predicted effects. Consequently, there is more flexibility across space and through time to adjust activities and still achieve standards for aquatic and terrestrial conservation, clean air and water, and maintenance or improvement of ecosystem integrity.

- Alternatives that are more consistent with the biophysical regime and inherent disturbance processes have activities that are more concentrated in time and space. Consequently, activities at mid- and fine-scales can be implemented at lower cost per unit of area, and there is a lower probability of losing investments to unexpected disturbance events.

To assess the flexibility of management activity levels in relation to broad-, mid-, and fine-scale patterns, processes, and effects, we used:

- Information from the multiple stochastic simulations of CRBSUM (Keane and others 1996).

- Summary of mid-scale dynamics (Hessburg and others 1996; Ottmar and others 1996).

- Multi-scale analysis of landscape dynamics (Hann and others, in press).

- Estimates of response that would be obtained from multiple stochastic simulations at a mid- and fine-scale level.

Estimates at the mid- and fine-scale levels were based on our analysis of multi-scale relationships within the various model prescriptions assigned to the alternative strategies, which included:

- Multi-scale data in CRBSUM prescription models.

- CRBLAD data system.

- Mid- and fine-scale projection models.

- Mid-scale landscape dynamics (Hessburg and others 1996; Ottmar and others 1996).

• Fine-scale plot data (Hann and others, in press; Hann and others 1997).

It is important to emphasize that the estimates for the mid- and fine-scale levels are useful for displaying differences across alternatives at the Basin scale, but would not likely be adequate for implementation. Three variables were evaluated to provide a basis for determining the flexibility between alternatives:

• Similarity of an alternative's trajectory to the biophysical and succession/disturbance regime of multi-scale patterns and processes across space and through time.

• Alternative theme, DFCs, and standards, that would provide for consistency of forest and range activities in producing effects similar to the native regime.

• Consistency of the alternative's theme, DFCs, and standards; adjusted by the alternative's flexibility and emphasis, to adjust standards in order to improve consistency with the biophysical regime and inherent disturbance processes.

Because of the large departures of the trajectories of the no action alternatives (1 and 2) from the biophysical regime and succession/disturbance regime, the predictability of disturbance response for these two alternatives is poor (table 2.21). These predictability ratings produce low confidence in the ability of Alternatives 1 and 2 to achieve their projected activity levels, in both the short and long term, coincidental to meeting the theme and DFCs. Alternatives 4 and 6 have the highest predictability based on the assumption that single state/size standards (such as riparian buffers) would be refitted to the biophysical template within the first decade. Alternatives 3, 5 and 7 have respectively less confidence. Alternative 4 has higher confidence than Alternative 6 because of higher rates of restoration of high risk wildfire, road, and riparian conditions in the first decade.

Large differences also exist in the flexibility among alternatives to consider how the various activities might substitute for each other and still produce the same effects (such as harvest, thinning, or grazing for prescribed fire). For example, because most activities in the no action alternatives fit a traditional commodity or reserve pattern, and also have high potential for variability in effects between administrative units, those two alternatives have low flexibility to mix activities. As a result, the confidence in producing the predicted effects is relatively low, even without changing the activity levels or exchanging activities.

Alternatives 7, 5, 3, 4, and 6 have successively increased levels of confidence. The no action alternatives also have very low connectivity between standards of different scales and high potential for one or two fine-scale standards to change the outcome at a coarser scale in a manner that is either unpredictable or does not achieve the desired outcomes or standards. Alternatives 7, 5, 3, 4 and 6

Table 2.21 — Difference in confidence and flexibility of projected management-implementation activity levels based on a revitalized index for multi-scale relationships.

	Alternative						
	1	2	3	4	5	6	7
Biophysical Regime Response Predictability	0.20	0.20	0.55	0.90	0.40	0.80	0.35
Activity Mixing Flexibility to Produce Similar Effects	0.15	0.10	0.60	0.80	0.30	0.85	0.20
Connectivity Between Biophysical Regime and Standards of Different Scales	0.10	0.15	0.25	0.80	0.25	0.90	0.25
Relative Activity Level Flexibility	1.00	1.00	3.13	5.56	2.20	5.67	1.80

have respectively greater levels of flexibility. The high levels in Alternatives 6 and 4 are based on the assumption that single state/size standards (such as riparian buffers) will be adjusted and fit to the biophysical template within the first decade.

By combining the three variables (similarity of trajectory, activity consistency, and scale connectivity), a relative index of the flexibility in the total activity levels was determined. The no action alternatives would have the lowest combined values and provide the base index of 1.0. A base index of 1.0 generally indicates that there would be little relative room for adjustments in implementing and monitoring the management activity levels as well as low confidence in ability to produce the predicted effects.

Alternatives 4 and 6 would have the highest flexibility for implementation of activities because they have: predictable outcomes, activities that can be exchanged for each other and still produce the same effects, and standards that are potentially well connected between scales. However, this level of flexibility is based on assumptions that a multiscale process of regional and subregional implementation analysis, watershed analysis, and monitoring will be implemented and maintained. It is important to emphasize that this is an assumption that was not apparent from the text in Chapter 3 of the preliminary draft EISs. Our modeling of multi-scale relationships was not adequate to determine the actual flexibility in management activity levels but acceptable for the relative comparisons. We emphasize that the flexibility index rating is only a relative comparison and cannot be used to adjust activity levels until a multi-scale implementation analysis is conducted as described in the landscape assumptions. There is a risk with Alternative 6 that the slower rate of implementation compared to Alternative 4 may result in the loss of key elements (such as large, old trees to wildfire or erosion from roads) which is not adequately reflected in the predictability variable.

Because of the adaptive management approach, Alternative 6 was rated with a high index for flexibility and Alternative 4 was rated second highest. Although Alternative 6 would have a lower level of activities than Alternative 4 in the first decade, it could produce a higher level of activities in the long term due to the adaptive management approach. Alternative 4 is considered to have more rapid rates of activity implementation than Alternative 6, because of less emphasis on watershed analysis and adaptive management. Compared to the no action alternatives, the activity levels in Alternatives 4 and 6 could be increased substantially based on the landscape assumptions discussed in this chapter, without changing the alternative's broad-scale trajectory or effects, including implementation cost. *We emphasize that at the broad- and mid-scales it is not the amount of management activities by area that drives the effects, but the design, rate of implementation, spatial pattern, and timing that are the critical variables.*

Alternatives 3 and 5 generally would have moderate predictability potential for exchanging activities, and for connection of standards between scales. These two alternatives differ substantially from Alternatives 4 and 6. Alternative 3 emphasizes local priorities and has a minimal change of forest and resource plans, consequently providing less emphasis on Basin-wide priorities and consistency of management for the biophysical regime and inherent disturbance processes. Alternative 5 emphasizes economic efficiency with active management in the productive lands, which (like Alternative 3) results in less emphasis on Basin-wide priorities and consistency of management for the biophysical regime and inherent disturbance processes. Of particular concern, the spatial allocation of restoration activities in Alternative 5 places low emphasis on less productive lands which often have the highest risks for unpredictable events and loss of biophysical capability. Alternative 7 is a mix of a reserve approach, which has low predictability, and management similar to Alternative 3 on the nonreserve areas, which has moderate predictability.

Simulations Compared to Alternative Management Activities

The simulated combined forest management activities are within or very close to the range given in Chapter 3 of both preliminary draft EISs

for all alternatives. Alternative 2 is slightly low because of lower than desired prescribed fire and thinning, but harvest is slightly high so they could be exchanged (table 2.22 and figures 2.25 and 2.26). Alternative 3 is a little high because of higher levels of simulated prescribed fire than desired. However, this can be exchanged to increase low levels of simulated thinning. Alternative 7 is slightly high for the EEIS area because of higher simulated than desired harvest in the nonreserve areas, but this can be exchanged to in crease low levels of simulated thinning.

Simulated rangeland combined-management activities are within or very close to the range given in Chapter 3 of both preliminary draft EISs for all alternatives. Alternatives 1 and 2 are low for the UCRB area because of a low simulation of prescribed fire and range vegetation improvements (table 2.23 and figures 2.27 and 2.28). However, this may be an actual effect when considering the low level of current range management budgets, compared to the expectations of the forest and resource plans. Alternative 2 is somewhat low for the UCRB for reasons similar to Alternative 1. Alternatives 3, 4, 5 and 6 in the EEIS area are high because of higher levels of simulated prescribed fire than desired from the preliminary draft EIS Chapter 3 activity levels. We feel the preliminary draft EISs may have underestimated these levels given the amount of decadent shrublands, and woodland and conifer encroachment, in the EEIS area; and that the simulated level better reflects the DFCs and themes of Alternatives 3 and 4 than the Chapter 3 activity levels.

Relative to these critical variables, Alternatives 4 and 6 have the highest ability, Alternatives 3, 5 and 7 moderate ability, and Alternatives 1 and 2 the lowest ability, to transition landscapes toward consistency with their biophysical regime and inherent landscape disturbance processes; thus conserving or improving ecosystem integrity. *We emphasize again, however, that at the broad- and mid-scales, it is not the amount of management activities by area that drives landscape response, but the design, rate of implementation, spatial pattern, and timing of treatments within and across years that are the critical variables.*

Table 2.22 — Forest vegetation management and prescribed fire for first decade.

EIS Area	Alternative	Preliminary Draft EIS, Minimum	Simulation Activities	Preliminary Draft EIS, Maximum
		Hectares[2]		
EEIS[1]	1	796,000	894,000	1,071,000
	2	563,000	530,000	757,000
	3	997,000	1,424,000	1,350,000
	4	1,246,000	1,418,000	1,688,000
	5	1,042,000	1,386,000	1,411,000
	6	1,111,000	1,378,000	1,500,000
	7	609,000	858,000	820000
UCRB[1]	1	926,000	994,000	1,254,000
	2	608,000	536,000	825,000
	3	1,083,000	1,733,000	1,467,000
	4	1,369,000	1,672,000	1,850,000
	5	1,118,000	1,132,000	1,512,000
	6	1,082,000	1,427,000	1,467,000
	7	717,000	730,000	972,000

[1]EEIS = Eastside EIS area.
UCRB = Upper Columbia River Basin EIS area.

[2]Rounded to nearest thousand; includes harvest, thinning and prescribed fire (planned and unplanned ignitions).

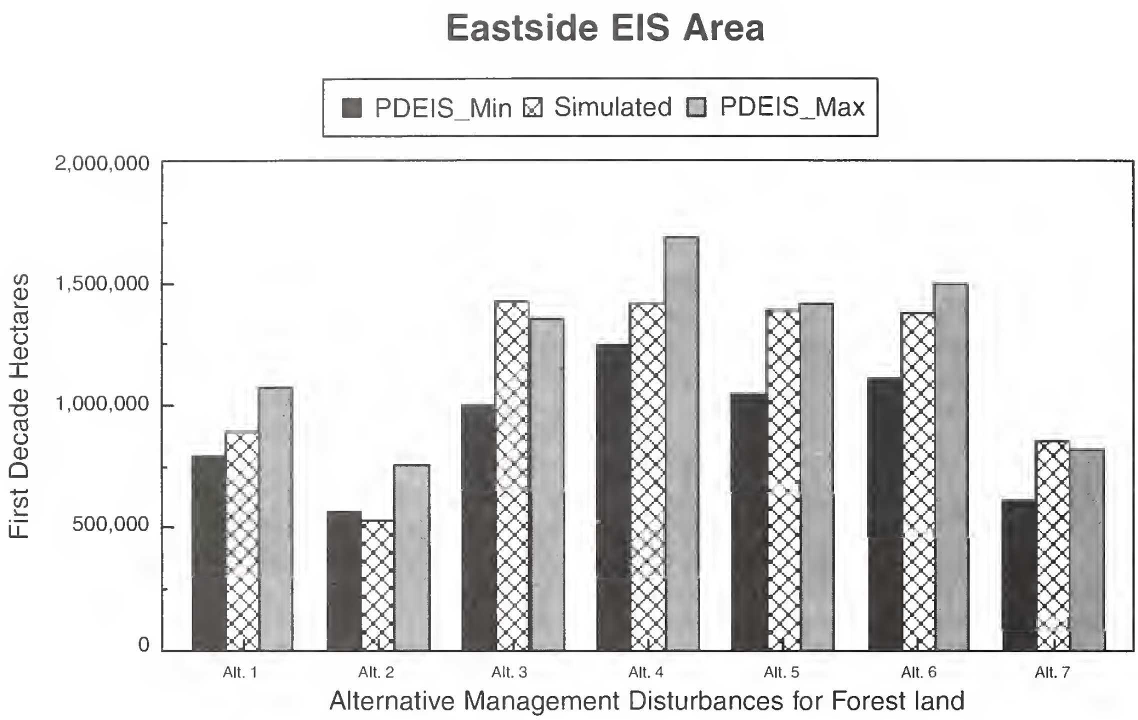


Figure 2.25 — Simulation compared to alternative management activities for BLM- and FS-administered forest land of the EEIS.

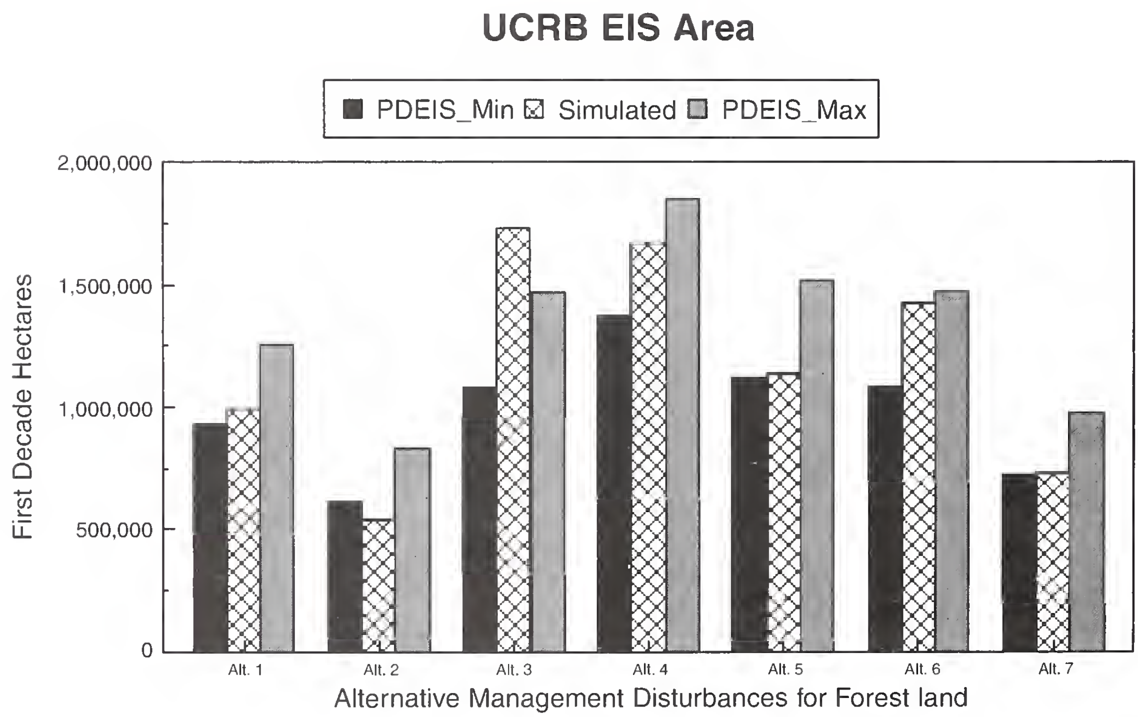


Figure 2.26 — Simulation compared to alternative management activities for BLM- and FS-administered forest land of the UCRB.

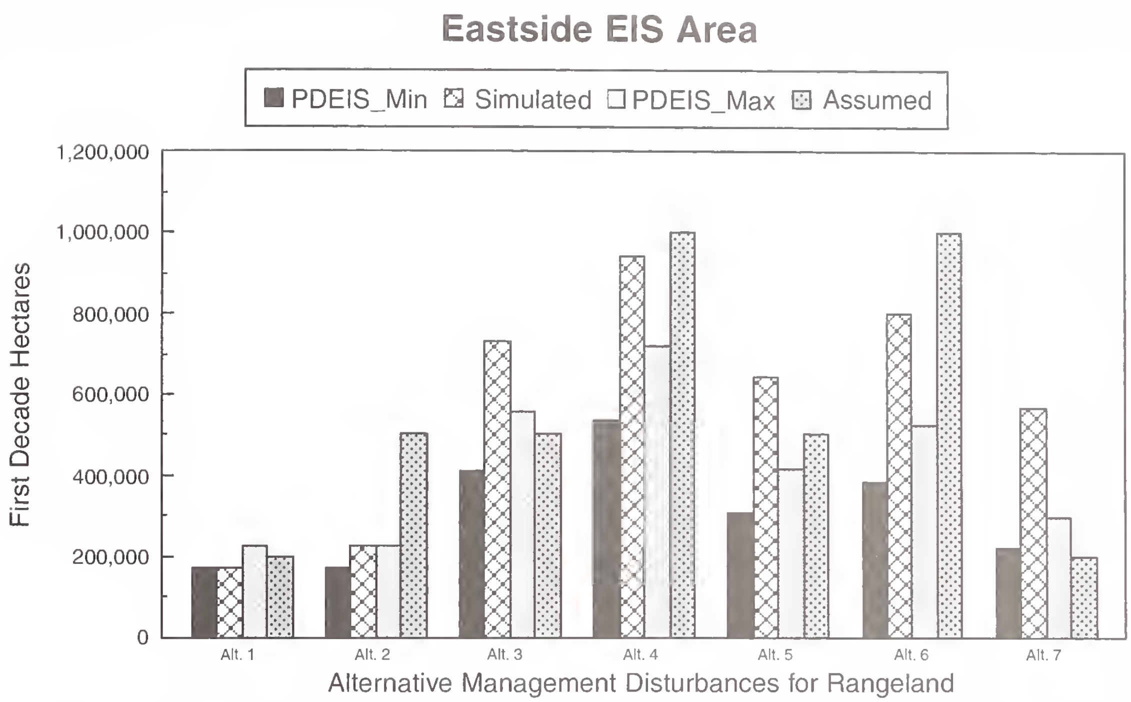


Figure 2.27 — Simulation compared to alternative management activities for BLM- and FS-administered rangeland of the EEIS.

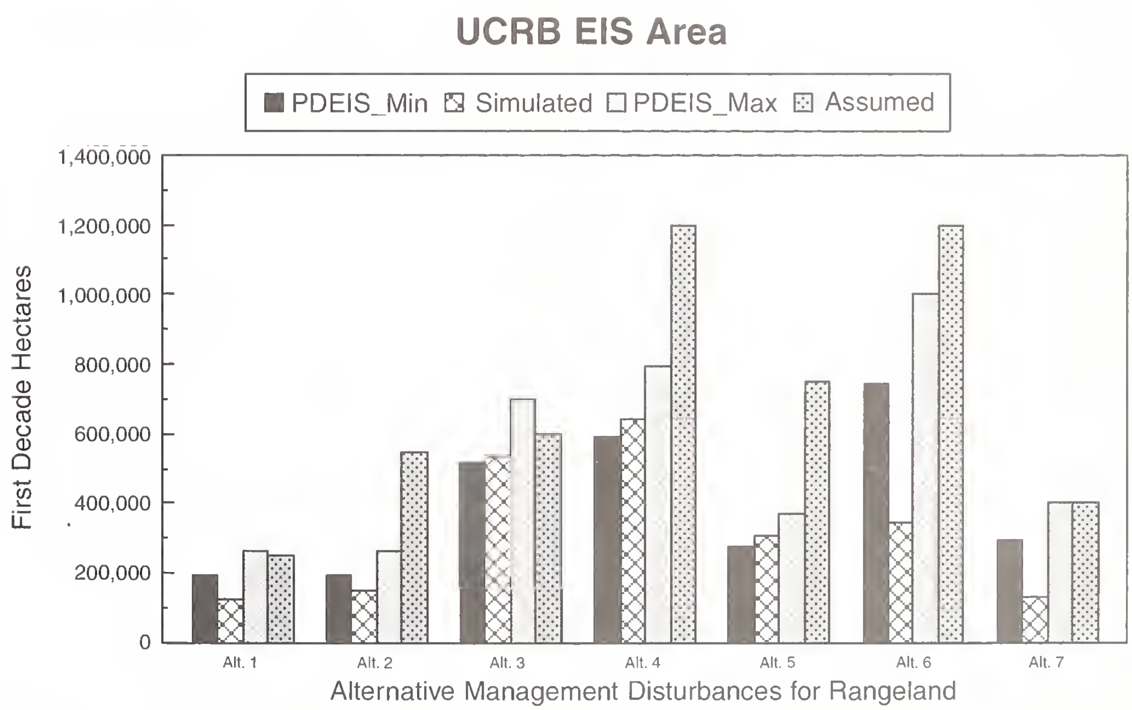


Figure 2.28 — Simulation compared to alternative management activities for BLM- and FS-administered rangeland of the UCRB.

Table 2.23 — Rangeland improvements and prescribed fire activities for first decade.

EIS Area	Alternative	Preliminary Draft EIS, Minimum	Simulation Activities	Preliminary Draft EIS, Maximum	Assumed[1] AMP Revision/ Implementation
		Hectares[3]			
EEIS[2]	1	170,000	171,000	227,000	200,000
	2	170,000	225,000	227,000	500,000
	3	412,000	729,000	558,000	500,000
	4	535,000	941,000	720,000	1,000,000
	5	310,000	643,000	418,000	500,000
	6	385,000	799,000	522,000	1,000,000
	7	220,000	565,000	298,000	200,000
UCRB[2]	1	192,000	128,000	261,000	250,000
	2	192,000	150,000	261,000	550,000
	3	518,000	532,000	700,000	600,000
	4	589,000	639,000	795,000	1,200,000
	5	277,000	308,000	374,000	750,000
	6	744,000	345,000	1,004,000	1,200,000
	7	295,000	133,000	401,000	400,000

[1]Assumed for simulation purposes; not in preliminary draft EIS Chapter 3.

[2]EEIS = Eastside EIS area.
UCRB = Upper Columbia River Basin EIS area.

[3]Rounded to nearest thousand; includes structural and nonstructural range improvements plus prescribed fire (planned and unplanned ignitions).

Terrestrial Communities

The composition of communities across a landscape directly affects ecosystem processes and functions. Because of this interrelationship, we attempt to understand how the various community components interact and respond to differences in their environment to accurately portray subsequent ecosystem changes.

Each of landscape's vegetation communities has ecological implications at multiple scales. The landscapes change over time and space, that is temporally and spatially. Because these changes are so numerous and complex, our ability to detect change varies. However, by studying the magnitude and rates at which landscape composition varies, we can improve our ability to predict the effects of change on ecological processes and functions. We can also estimate the landscape's suitability and the probability of persistence for relevant biota, namely the plants and animals that live there. To better understand the complexity of ecosystem dynamics, such studies must be conducted across multiple temporal and spatial scales.

For evaluation of terrestrial community departures, we used a continuous coverage of broad-scale vegetation data to assess the historic-to-current and projected future change of vegetation communities within 164 subbasins of the Basin. An assessment of broad-scale vegetation changes across larger geographic scales within the Basin was needed to provide a context for potential ecological effects across varying spatial and temporal scales. For example, do historic-to-current trends continue into the future, and are the future trends consistent between the Basin as a whole and the two EIS areas, and among all ownerships and BLM- and FS- administered lands within these two regions?

We hoped that quantitative data about the spatial differences of broad-scale vegetation change would help biologists and botanists to infer persistence probabilities of relevant biota. As an example, a species may be either widely- or sparsely-distributed throughout a landscape, or be restricted to relatively smaller areas within a landscape in peripheral, disjunct, or endemic distribution patterns (Lesica and Shelly 1991).

The persistence of widely- or sparsely-distributed species may be more closely associated with the community composition of the entire Basin. Conversely, the persistence of other species having smaller geographic ranges in peripheral, disjunct or endemic distributions may be more closely correlated with the community composition of smaller landscapes such as the two EIS areas. Because of these different landscape correlations among species, we discuss the historic-to-current period change in composition of broad-scale vegetation communities throughout the Basin as a whole; within the two EIS assessment regions, which are the Eastside EIS and the Upper Columbia EIS areas; and within different ownership strata of these two regions.

We evaluated the proportional change of a community's areal extent, which is its class change. In the evaluation, we realized that a community's areal extent may not currently exhibit substantial ecological consequences if changes have occurred to the community within some expected range of variation in which biological entities and processes have since evolved. Therefore, only by comparing the magnitude of change to some historical range of expected conditions can we infer trends in ecosystem structure, composition, and functions.

Currently, there is a significant lack of information about the broad-scale habitat relationships and the population responses to habitat change for most species occurring in the Basin. A comparison of the projected availability of broad-scale vegetation community types to their expected historical range of conditions allows coarse-filter inferences of the risks to species persistence (Hunter 1991). A primary assumption of a coarse-filter approach to habitat assessment is: *If the areal extent of a community or habitat occurs within its estimated histor-*

ical range of conditions, then most species that have adapted to those historical conditions should be able to persist into the future. The likelihood of persistence decreases substantially as the availability of a community type falls below its historical range, and increases substantially when a community's extent occurs above its historical range. Fitness of many species is also strongly correlated with fine-scale habitat attributes. Although we addressed fine-scale attributes through statistical inference, we could not precisely simulate fine-scale attribute distribution in response to DEIS alternatives.

Methods for Evaluating Terrestrial Communities

We aggregated 41 cover types and 25 structural stages into 24 terrestrial communities, grouping them according to similarities in moisture, temperature, elevation, structure, and use by vertebrate species (table 2.24).

Trends were quantified for each alternative by the percent of change in terrestrial communities between historic and current periods, and between current and 100-year projections. Future availabilities of terrestrial communities were simulated by CRBSUM, which is a spatially explicit, deterministic vegetation simulation model with stochastic properties (Keane and others 1996).

Ecologically significant trends within a community were said to occur if the community's areal extent changed by at least 20 percent within the stratum being assessed. We evaluated current and future availabilities of each community in respect to the predicted historical range. Historical ranges of the areal extent of vegetation community types were simulated for each stratum by CRBSUM. Minimum and maximum historical values were defined for a single 400-year run, with the outputs simulated for years 0, 50, 100, 200, 300, and 400. Initial conditions were denoted as year 0 for both the historical simulations and the alternative simulation process (Menakis and others 1996).

Trends were summarized for the following six region and ownership strata:

- ICBEMP Assessment Area: all ownerships.
- ICBEMP Assessment Area: BLM- and FS-administered lands.
- Eastside EIS area: All ownerships.
- Eastside EIS area: BLM- and FS-administered lands.
- Upper Columbia River Basin EIS area: All ownerships.
- Upper Columbia River Basin EIS area: BLM- and FS-administered lands.

Assumptions and Notes About Simulation Methods and Results

Following are some assumptions and notes about simulation methods and results for riparian, exotic, and terrestrial communities.

Riparian Communities — The areal extent for riparian types such as riparian herblands, shrublands, and woodlands was underestimated historically and not accurate for the current period (Jones and Hann 1996). Based on mid-scale samples (Hessburg and others 1996) we assumed that riparian communities had ecologically significant declines between historic and current periods.

Although the current extent of riparian types was not accurate, the predicted future trends (not amounts) for riparian communities are considered reasonable. Therefore, our discussion of riparian types in the following text will be limited to projected future trends.

Trends in riparian community responses for Alternatives 2 through 6 were more negative than suggested by the objectives and the standards (appendix I) for those alternatives. To estimate riparian community effects more precisely for those five alternatives, we suggest that more reliance be placed on DEIS alternative objectives and standards than on our simulations.

Table 2.24 — Cover type and structural stage composition of terrestrial communities.

Terrestrial Community		Cover Types	Structural Stages
Agriculture		Cropland/hay/pasture	N/A[1]
Barren/rock		Barren	N/A
Water		Water	N/A
Urban		Urban	N/A
Subalpine forests:	early-seral mid-seral late-seral multi-layer late-seral single-layer	Whitebark pine/alpine larch, mountain hemlock, Engelmann spruce/ subalpine fir, whitebark pine	1 2, 3, 4, 5 6 7
Montane forests:	early-seral mid-seral late-seral multi-layer late-seral single-layer	Pacific silver fir/mountain hemlock, grand fir/white fir, red fir, interior Douglas-fir, western larch, western white pine, lodgepole pine, western red cedar/western hemlock, Sierra mixed conifer	1 2, 3, 4, 5 6 7
Lower montane forests:	early-seral mid-seral late-seral multi-layer late-seral single-layer	Interior ponderosa pine, Pacific poderosa pine	1 2, 3, 4, 5 6 7
Upland woodlands		Limber pine, Oregon white oak juniper woodlands, mixed conifer woodlands, juniper/sagebrush	All
Upland shrublands		Antelope bitterbrush/bluebunch wheatgrass, mountain mahogany, mountain big sagebrush, low sagebrush, salt desert shrub, chokecherry/serviceberry/rose, big sagebrush	All
Upland herblands		Agropyron bunchgrass, native forb, fescue/bunchgrass	All
Alpine tundra		Alpine tundra	All
Riparian woodlands		Aspen, cottonwood/willow	All
Riparian shrublands		Wetland/shrub	All
Riparian herblands		Herbaceous wetlands	All
Exotic herblands		Exotic forb/annual grass	All

[1]N/A = Not Applicable.

Exotic Herbland — The areal extent of the exotic herbland community compared to other alternatives was overestimated for the 100-year projection of Alternative 2. Since the projected increase in exotic herblands was derived from primarily the upland shrubland community, the areal extent of upland shrubland was underestimated for the Alternative 2 projection. However, we believe that the objectives of Alternative 2 are similar to those of Alternative 1, at least regarding the dispersal and control of exotic plants. Consequently, modeled values of the exotic herblands, upland shrubland, and upland herbland communities were adjusted to those of Alternative 1. Rates of increase for the exotic community were modeled conservatively for all alternatives. Because of these modeling adjustments, the exotic community would likely increase at a faster rate than projected.

Terrestrial Communities in Alternative 7 — Terrestrial communities were modeled using a first iteration of management prescriptions (Rx) rather than the second and improved iteration; as a result of lack of time. Consequently, the trends that would be more representative of the preliminary draft EIS Alternative 7 are qualitatively discussed in reference to the simulation. An improved simulation would be more of an average between the simulated Alternative 7 and the simulation of Alternative 3.

Results of Evaluating Terrestrial Communities by Alternative

Alternative 1

ICBEMP Assessment Area: All Ownerships — Ecologically significant trends were projected for 58 percent of the terrestrial communities in this region and stratum (table 2.25). Increases of approximately 200 to 400 percent were projected to occur in three communities: early-seral lower montane, and the late-seral multi-layer communities of lower montane and subalpine. Conversely, there would be decreases of more than 50 percent in four others: the late-seral single-layer communities of montane and subalpine, and the herbland and woodland riparian communities.

Alternative 1 would reverse the significant historic to current trends for 8 of 16 communities. However, significant losses would continue for the late-seral lower montane single layer, all three riparian communities, and the upland shrubland communities. Conversely, significant increases would continue for the exotic herbland, mid-seral lower montane, and upland woodland communities.

Under Alternative 1, 62 percent of the communities of the entire Basin would likely fall outside of their historical ranges after 100 years (table 2.26). While the areal extents of five communities that currently occur outside of their historical ranges would likely fall within their historical ranges, two types currently within their historical ranges would likely occur outside.

ICBEMP Assessment Area: BLM- and FS-administered Lands — Ecologically significant changes were projected between the current period and year 100 across 58 percent of the terrestrial communities in this region and stratum (table 2.27).

Significant historic to current period trends would be reversed for 5 of 11 types: early-seral lower montane, early-seral subalpine, late-seral single- and multi-layer subalpine, and upland herbland. Significant historic to current declines would continue in all three riparian communities and the late-seral lower montane single-layer communities, whereas positive trends would continue for the exotic herbland community.

Under Alternative 1, about 34 percent of the terrestrial communities on BLM- and FS-administered lands in the Basin would likely occur at levels outside of their historical ranges after 100 years (table 2.28).

Eastside EIS: All Ownerships — We detected ecologically significant class changes between current and year 100 for 67 percent of the terrestrial communities in this region and stratum (table 2.29).

Table 2.25 — Historical and future trends[1] of the areal extent of terrestrial communities for all ownerships within the Basin. Values are expressed as percent change.

Terrestrial Community	Historical Trend	Alt. 1 Yr. 100	Alt. 2 Yr. 100	Alt. 3 Yr. 100	Alt. 4 Yr. 100	Alt. 5 Yr. 100	Alt. 6 Yr. 100	Alt. 7 Yr. 100
Agricultural	N/A[2]	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.9
Alpine	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Early-seral Montane Forest	-8.4	-18.5	-2.2	-10.1	-11.6	-11.0	-14.1	-2.2
Early-seral Lower Montane Forest	-76.8	408.1	315.7	465.7	467.7	459.9	451.7	303.0
Early-seral Subalpine Forest	48.2	-42.4	-44.0	-9.1	-8.2	-22.1	-24.9	-50.0
Exotic Herbland[3]	N/A	84.2	84.2	29.1	27.7	51.0	17.5	94.5
Late-seral Montane Forest Multi-layer	-11.2	36.7	58.3	54.9	57.9	50.7	62.1	82.8
Late-seral Montane Forest Single-layer	8.4	-62.6	-46.8	-40.1	-38.0	-39.1	-35.2	-23.0
Late-seral Lower Montane Forest Multi-layer	-34.5	225.2	193.2	159.6	159.6	164.9	165.2	215.1
Late-seral Lower Montane Forest Single-layer	-80.6	-30.9	-1.9	123.2	123.2	113.9	112.5	13.9
Late-seral Subalpine Forest Multi-layer Multi-layer	-63.8	266.4	277.2	221.6	228.1	242.5	262.4	366.0
Late-seral Subalpine Forest Single-layer	36.3	-55.9	-55.2	-55.9	-56.0	-55.7	-56.1	-62.4
Mid-seral Montane Forest	58.6	-20.3	-25.5	-25.0	-25.4	-23.8	-24.8	-32.0
Mid-seral Lower Montane Forest	53.0	19.3	6.5	-2.9	-2.8	-1.3	-2.2	-3.2
Mid-seral Subalpine Forest	-1.0	-10.3	-17.4	-23.5	-22.5	-21.0	-19.7	-17.1
Rock/Barren	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Upland Herbland	-66.8	87.5	66.0	99.7	108.1	92.0	105.6	80.1
Upland Shrubland	-30.5	-21.7	-24.5	-19.2	-20.4	-19.5	-19.0	-19.4
Upland Woodland	49.5	9.4	11.1	3.5	2.3	4.7	4.1	-1.0
Urban	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0

[1]Historical trend = percent change between historical and current periods.
Future trend = percent change between current period and year 100 for each alternative.

[2]N/A = Not Applicable.

[3]Amunt adjusted in Alternative 2 due to errors in modeling.

Table 2.26 — Areal extent (percentage) of terrestrial communities for minimum, maximum, and initial historical; current; and future projections for year 100 for the preliminary draft EISs alternatives for all ownerships within the Basin.

Terrestrial Community	Historical Minimum	Historical Maximum	Historical Initial	Current Level	Alt. 1 Yr. 100	Alt. 2 Yr. 100	Alt. 3 Yr. 100	Alt. 4 Yr. 100	Alt. 5 Yr. 100	Alt. 6 Yr. 100	Alt. 7 Yr. 100
	Percentage										
Agricultural	0.0	0.0	0.0	16.1	15.6	15.6	15.6	15.6	15.6	15.6	15.6
Alpine	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Early-seral Montane Forest	7.7	8.7	8.7	7.9	6.5	7.8	7.1	7.0	7.1	6.8	7.8
Early-seral Lower Montane Forest	1.1	2.7	1.1	0.3	1.3	1.1	1.5	1.46	1.4	1.4	1.0
Early-seral Subalpine Forest	0.8	1.2	1.2	1.8	1.0	1.0	1.6	1.7	1.4	1.3	0.9
Exotic Herbland[1]	0.0	0.0	0.0	2.1	3.8	3.8	2.7	2.6	3.1	2.4	4.0
Late-seral Montane Forest Multi-layer	3.8	6.6	3.8	3.4	4.6	5.3	5.2	5.3	5.1	5.5	6.2
Late-seral Montane Forest Single-layer	0.8	1.4	0.8	0.8	0.3	0.5	0.5	0.5	0.5	0.5	0.7
Late-seral Lower Montane Forest Multi-layer	1.7	2.3	2.2	1.4	4.6	4.2	3.7	3.7	3.8	3.8	4.5
Late-seral Lower Montane Forest Single-layer	4.8	5.6	5.6	1.1	0.7	1.1	2.4	2.4	2.3	2.3	1.2
Late-seral Subalpine Forest Multi-layer	1.2	2.5	1.2	0.4	1.6	1.7	1.4	1.5	1.5	1.6	2.1
Late-seral Subalpine Forest Single-layer	0.2	0.6	0.6	0.8	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Mid-seral Montane Forest	10.2	12.0	10.5	16.6	13.2	12.4	12.5	12.4	12.7	12.5	11.3
Mid-seral Lower Montane Forest	3.9	4.9	4.9	7.5	9.0	8.0	7.3	7.3	7.4	7.4	7.3
Mid-seral Subalpine Forest	2.2	2.7	2.7	2.7	2.4	2.2	2.1	2.1	2.1	2.2	2.2
Riparian Herbland[2]	0.3	1.0	—	—	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Riparian Shrubland[2]	0.4	0.8	—	—	0.3	0.3	0.3	0.3	0.3	0.2	0.2
Riparian Woodland[2]	1.0	1.3	—	—	0.7	0.9	0.8	0.8	0.8	0.7	0.9
Rock/Barren	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Upland Herbland	14.9	21.5	14.9	4.9	9.3	8.2	9.9	10.3	9.5	10.1	8.9
Upland Shrubland	27.0	36.7	36.7	25.5	20.0	19.3	20.6	20.3	20.5	20.6	20.6
Upland Woodland	1.9	2.3	1.9	2.8	3.1	3.2	2.9	2.9	3.0	3.0	2.8
Urban	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Water	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9

[1]Amount adjusted in Alternative 2 due to errors in modeling.

[2]Due to problems with resolution of historic mapping, the historic to current trend is not applicable. However, the future changes are somewhat useful if used as trends.

Table 2.27 — Historical and future trends[1] of the areal extent of terrestrial communities for BLM- and FS-administered lands within the Basin. Values are expressed as percent change.

Terrestrial Community	Historical Trend	Alt. 1 Yr. 100	Alt. 2 Yr. 100	Alt. 3 Yr. 100	Alt. 4 Yr. 100	Alt. 5 Yr. 100	Alt. 6 Yr. 100	Alt. 7 Yr. 100
Agricultural	N/A[2]	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.9
Alpine	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Early-seral Montane Forest	9.2	-20.3	-25.9	-8.6	-10.6	-9.8	-13.6	-23.9
Early-seral Lower Montane Forest	-70.9	354.2	271.5	445.5	448.6	436.3	423.2	251.4
Early-seral Subalpine Forest	46.6	-44.9	-44.2	-8.2	-7.3	-22.6	-25.6	-50.8
Exotic Herbland[3]	N/A[2]	30.1	30.1	-67.7	-70.2	-28.9	-64.6	-46.2
Late-seral Montane Forest Multi-layer	4.0	23.9	58.1	46.9	50.7	41.7	56.0	89.1
Late-seral Montane Forest Single-layer	-5.1	-54.6	-30.1	-18.3	-14.8	-16.7	-10.3	8.4
Late-seral Lower Montane Forest Multi-layer	-13.6	118.1	142.2	20.6	20.6	28.3	28.8	174.6
Late-seral Lower Montane Forest Single-layer	-79.3	-5.1	-28.0	275.3	275.4	258.3	255.8	0.5
Late-seral Subalpine Forest Multi-layer	-61.4	235.0	252.9	186.3	193.3	209.0	230.7	349.7
Late-seral Subalpine Forest Single-layer	28.7	-55.3	-54.6	-55.3	-55.4	-55.0	-55.5	-62.7
Mid-seral Montane Forest	28.7	-12.2	-13.9	-19.7	-20.3	-17.7	-19.3	-24.3
Mid-seral Lower Montane Forest	9.6	53.9	31.7	-4.4	-4.3	-0.4	-2.7	6.4
Mid-seral Subalpine Forest	-2.6	-15.1	-17.3	-30.2	-29.2	-27.4	-25.9	-17.0
Rock/Barren	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Upland Herbland	-20.1	80.6	29.3	106.3	124.0	90.0	113.5	131.0
Upland Shrubland	-7.8	-16.0	-20.4	-12.0	-14.0	-12.6	-13.3	-15.7
Upland Woodland	-11.6	44.5	49.0	29.3	26.1	32.5	30.7	18.0
Urban	N/A	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

[1]Historical trend = percent change between historical and current periods.
Future trend = percent change between current period and year 100 for each alternative.

[2]NA = Not Applicable.

[3]Amount adjusted in Alternative 2 due to errors in modeling.

Table 2.28 — Areal extent (percentage) of terrestrial communities for minimum, maximum, and initial historical; current; and future projections for year 100 for preliminary draft EIS alternatives for BLM- and FS-administered lands within the Basin.

Terrestrial Community	Historical Minimum	Historical Maximum	Historical Initial	Current Level	Alt. 1 Yr. 100	Alt. 2 Yr. 100	Alt. 3 Yr. 100	Alt. 4 Yr. 100	Alt. 5 Yr. 100	Alt. 6 Yr. 100	Alt. 7 Yr. 100
	Percentage										
Alpine	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Early-seral Montane Forest	9.5	10.2	10.1	11.0	8.8	8.2	10.1	9.8	9.9	9.5	8.4
Early-seral Lower Montane Forest	1.1	2.4	1.1	0.3	1.4	1.2	1.7	1.7	1.7	1.6	1.1
Early-seral Subalpine Forest	1.2	2.2	2.2	3.2	1.7	1.8	2.9	2.9	2.4	2.3	1.6
Exotic Herbland[1]	0.0	0.0	0.0	2.2	2.9	2.9	0.7	0.7	1.6	0.8	1.2
Late-seral Montane Forest Multi-layer	5.0	8.8	5.0	5.2	6.4	8.2	7.6	7.8	7.3	8.0	9.8
Late-seral Montane Forest Single-layer	1.1	1.8	1.1	1.0	0.5	0.7	0.8	0.9	0.8	0.9	1.1
Late-seral Lower Montane Forest Multi-layer	1.7	2.2	2.1	1.8	4.0	4.5	2.2	2.2	2.4	2.4	5.1
Late-seral Lower Montane Forest Single-layer	4.6	5.6	5.5	1.1	1.1	0.8	4.3	4.3	4.1	4.1	1.2
Late-seral Subalpine Forest Multi-layer	2.1	4.0	2.1	0.8	2.7	2.8	2.3	2.3	2.4	2.6	3.6
Late-seral Subalpine Forest Single-layer	0.4	1.1	1.1	1.4	0.6	0.6	0.6	0.6	0.6	0.6	0.5
Mid-seral Montane Forest	13.7	16.9	15.7	20.3	17.8	17.4	16.3	16.1	16.7	16.3	15.3
Mid-seral Lower Montane Forest	3.4	5.1	5.1	5.5	8.5	7.3	5.3	5.3	5.5	5.4	5.9
Mid-seral Subalpine Forest	3.6	4.6	4.6	4.5	3.8	3.7	3.2	3.2	3.3	3.4	3.8
Riparian Herbland[2]	0.0	0.3	—	—	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Riparian Shrubland[2]	0.1	0.2	—	—	0.3	0.3	0.3	0.3	0.3	0.3	0.2
Riparian Woodland[2]	1.2	1.4	—	—	0.9	1.3	1.1	1.0	1.1	1.1	0.9
Rock/Barren	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Upland Herbland	5.7	14.0	5.7	4.5	8.2	5.8	9.3	10.1	8.6	9.7	10.4
Upland Shrubland	25.2	34.0	34.0	31.3	26.3	24.9	27.6	26.9	27.4	27.2	26.4
Upland Woodland	1.8	2.4	2.4	2.1	3.1	3.2	2.7	2.7	2.8	2.8	2.5
Urban	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3

[1]Amount adjusted in Alternative 2 due to errors in modeling

[2]Due to problems with resolution of historic mapping, the historic to current trend is not applicable. However, the future changes are somewhat useful if used as trends.

Table 2.29 — Historical and future trends[1] of the areal extent of terrestrial communities for all ownerships within the Eastside EIS. Values are expressed as percednt change.

Terrestrial Community	Historical Trend	Alt. 1 Yr. 100	Alt. 2 Yr. 100	Alt. 3 Yr. 100	Alt. 4 Yr. 100	Alt. 5 Yr. 100	Alt. 6 Yr. 100	Alt. 7 Yr. 100
Agricultural	0.0	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.9
Alpine	-0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Early-seral Montane Forest	10.6	-38.7	-21.3	-31.3	-31.9	-31.2	-32.3	-17.9
Early-seral Lower Montane Forest	-57.0	326.8	266.0	361.5	364.3	362.4	363.1	240.5
Early-seral Subalpine Forest	226.9	-35.9	-40.9	-15.0	-15.2	-17.9	-18.1	-43.4
Exotic Herbland[2]	0.0	188.3	188.3	126.0	122.3	138.0	105.4	263.3
Late-seral Montane Forest Multi-layer	93.7	-22.0	-11.5	-12.9	-12.2	-14.8	-11.6	-3.1
Late-seral Montane Forest Single-layer	142.3	-90.5	-89.2	-81.1	-81.2	-82.2	-81.6	-80.3
Late-seral Lower Montane Forest Multi-layer	-12.5	155.3	125.2	107.7	107.7	108.6	108.1	150.2
Late-seral Lower Montane Forest Single-layer	-75.9	-57.4	-29.3	56.1	55.9	53.1	54.2	-23.8
Late-seral Subalpine Forest Multi-layer	-32.7	94.2	104.5	80.5	83.5	83.0	88.9	156.7
Late-seral Subalpine Forest Single-layer	-29.4	-57.7	-56.2	-61.7	-63.3	-61.7	-63.0	-67.2
Mid-seral Montane Forest	62.4	-3.7	-8.6	-6.5	-6.6	-6.0	-6.8	-13.9
Mid-seral Lower Montane Forest	49.0	12.9	2.5	-8.5	-8.5	-7.8	-8.2	-8.4
Mid-seral Subalpine Forest	-66.7	89.2	72.1	52.7	53.5	57.6	56.3	69.7
Rock/Barren	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Upland Herbland	-76.8	184.3	153.3	202.7	218.9	197.3	215.3	136.1
Upland Shrubland	-31.1	-28.4	-32.2	-26.6	-28.4	-26.5	-27.0	-25.3
Upland Woodland	110.3	-27.6	-26.3	-33.9	-35.1	-33.8	-34.6	-26.3
Urban	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

[1]Historical trend = percent change between historical and current periods.
Future trend = percent change between current period and year 100 for each alternative.

[2]Amount adjusted in Alternative 2 due to errors in modeling.

Table 2.30 —Areal extent (percentage) of terrestrial communities for minimum, maximum and initial historical; current; and future projections; for year 100 for the preliminary draft EIS alternatives and all ownerships within the Eastside EIS.

Terrestrial Community	Historical Minimum	Historical Maximum	Historical Initial	Current Level	Alt. 1 Yr. 100	Alt. 2 Yr. 100	Alt. 3 Yr. 100	Alt. 4 Yr. 100	Alt. 5 Yr. 100	Alt. 6 Yr. 100	Alt. 7 Yr. 100
	Percentage										
Agricultural	0.0	0.0	0.0	20.4	19.9	19.9	19.9	19.9	19.9	19.9	19.9
Alpine	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Early-seral Montane Forest	5.9	7.4	5.9	6.5	4.0	5.1	4.5	4.4	4.5	4.4	5.3
Early-seral Lower Montane Forest	0.8	3.5	0.8	0.3	1.4	1.2	1.5	1.5	1.5	1.5	1.1
Early-seral Subalpine Forest	0.2	0.4	0.2	0.7	0.4	0.4	0.6	0.6	0.5	0.5	0.4
Exotic Herbland[1]	0.0	0.0	0.0	1.6	4.6	4.6	3.6	3.5	3.8	3.3	5.8
Late-seral Montane Forest Multi-layer	2.5	4.4	2.5	4.8	3.8	4.3	4.2	4.2	4.1	4.3	4.7
Late-seral Montane Forest Single-layer	0.5	1.0	0.5	1.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2
Late-seral Lower Montane Forest Multi-layer	1.9	3.0	2.7	2.3	6.0	5.3	4.8	4.8	4.9	4.9	5.8
Late-seral Lower Montane Forest Single-layer	5.7	8.6	8.6	2.1	0.9	1.5	3.2	3.2	3.2	3.2	1.6
Late-seral Subalpine Forest Multi-layer	0.4	0.9	0.4	0.3	0.5	0.6	0.5	0.5	0.5	0.5	0.7
Late-seral Subalpine Forest Single-layer	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0
Mid-seral Montane Forest	5.6	7.1	5.6	9.1	8.8	8.3	8.5	8.5	8.6	8.5	7.8
Mid-seral Lower Montane Forest	4.6	6.3	6.3	9.4	10.7	9.7	8.6	8.6	8.7	8.7	8.6
Mid-seral Subalpine Forest	0.8	1.6	1.6	0.5	1.0	0.9	0.8	0.8	0.8	0.8	0.9
Riparian Herbland[2]	0.4	1.0	—	—	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Riparian Shrubland[2]	0.4	0.8	—	—	0.3	0.3	0.4	0.4	0.4	0.3	0.3
Riparian Woodland[2]	0.1	0.1	—	—	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Rock/Barren	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Upland Herbland	17.2	26.6	17.2	4.0	11.3	10.1	12.1	12.7	11.8	12.6	9.4
Upland Shrubland	30.4	42.7	42.7	29.4	21.1	19.9	21.6	21.1	21.6	21.5	22.0
Upland Woodland	2.3	2.7	2.3	4.8	3.5	3.6	3.2	3.1	3.2	3.2	3.6
Urban	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Water	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2

[1]Amount adjusted in Alternative 2 due to errors in modeling

[2]Due to problems with resolution of historic mapping, the historic to current trend is not applicable. However, the current to future changes are somewhat useful if used as trends.

Historic to current significant trends would be reversed for nearly 50 percent of the communities. Significant declines would continue for six communities: the late-seral single-layer lower montane and subalpine, all three riparian communities, and upland shrubland. Conversely, an historic to current significant increasing trend would continue for exotic herbland and mid-seral lower montane forest communities.

Under Alternative 1, the areal extents of 67 percent of the terrestrial communities of all lands in the Eastside EIS area of the Basin would not likely occur within their historical ranges after 100 years (table 2.30).

Eastside EIS: BLM- and FS-administered Lands — We detected ecologically significant class changes between current and year 100 for 67 percent of the terrestrial communities in this region and stratum (table 2.31).

Historic to current significant trends would be reversed for 60 percent of the communities. However, historic to current significant declines would continue for five communities: late-seral single-layer lower montane and subalpine, and all three riparian types. Conversely, an historic to current significant increasing trend for exotic herblands would continue.

Under Alternative 1, the areal extents of 50 percent of the terrestrial communities on BLM- and FS-administered lands in the Eastside EIS area of the Basin would not likely occur within their historical ranges in 100 years (table 2.32).

Upper Columbia River Basin: All Ownerships —We detected ecologically significant class changes between current and year 100 for 62 percent of the terrestrial communities in this region and stratum (table 2.33). Six communities would increase by more than 100 percent, whereas three communities would decrease by at least 50 percent: late-seral subalpine single-layer, riparian herbland, and riparian woodland types.

Historic to current significant trends would be reversed for 68 percent of the communities. However, historic to current significant declines would continue for three communities: riparian herbland and riparian woodland, and upland shrubland types. Conversely, an historic to current significant increasing trend would continue for exotic herbland and mid-seral lower montane forest communities.

Under Alternative 1, the areal extents of 62 percent of the terrestrial communities of the entire Upper Columbia River Basin would not likely occur within their historical ranges after 100 years (table 2.34).

Upper Columbia River Basin: BLM- and FS-administered Lands — Ecologically significant class changes were detected between current and year 100 for 62 percent of the terrestrial communities in this region and stratum (table 2.35). Six communities would increase by more than 100 percent, whereas three communities would decrease by at least 50 percent: late-seral subalpine single-layer, and riparian herbland and riparian woodland types.

Historic to current significant trends would be reversed for 80 percent of the communities. While historic to current significant declines would continue for the riparian herbland and riparian woodland types, an historic to current significant increasing trend would continue for mid-seral lower montane forest.

Under Alternative 1, the areal extents of 38 percent of the terrestrial communities on BLM- and FS-administered lands in the Upper Columbia River Basin would not likely occur within their historical ranges in 100 years (table 2.36).

Alternative 2

ICBEMP Assessment Area: All Ownerships — We observed ecologically significant trends for 54 percent of the terrestrial communities in this region and stratum (table 2.25). Four communities would increase by at least 100 percent: early-seral lower montane forest, exotic herblands and the late-seral multi-layer lower montane and subalpine forests. Exotic herblands may be overestimated in

this alternative and may increase at a slower rate, similar to Alternative 1. Conversely, late-seral subalpine single-layer forest and riparian woodland communities would decline by about 50 percent.

Significant historic to current trends would reverse for 9 of 17 communities. Significant historic to current period declines would continue in the upland shrubland and all three riparian types, whereas significant historic to current period increases would continue in the exotic herbland, mid-seral lower montane forest, and upland woodland types.

Under Alternative 2, the areal extents of 58 percent of the terrestrial communities of the entire Basin would not likely occur at levels within their historical ranges within 100 years (table 2.26).

ICBEMP Assessment Area: BLM- and FS-administered Lands — Ecologically significant trends were projected across 67 percent of the terrestrial communities in this region and stratum (table 2.27). Four communities would increase by more than 100 percent: early-seral lower montane forest, exotic herblands and the late-seral multi-layer lower montane and subalpine. Conversely, the late-seral single-layer subalpine forest would decrease by more than 50 percent.

Significant historic to current trends would reverse for 6 of 11 communities. However, significant historic to current period losses would continue through year 100 for late-seral single-layer lower montane forests. Conversely, the historic to current increasing trend would continue for the exotic herbland community.

Under Alternative 2, the areal extents of 50 percent of the terrestrial communities on BLM- and FS-administered lands in the Basin would not likely occur at levels within their historical ranges in 100 years (table 2.28).

Eastside EIS: All Ownerships —We detected ecologically significant class changes between current and year 100 for 63 percent of the terrestrial communities in this region and stratum (table 2.29). Five communities would increase by more than 100 percent: early-seral lower montane, exotic herblands, late-seral multi-layer lower montane and subalpine, and upland herbland. Conversely, the late-seral single-layer montane and subalpine types would decrease by at least 50 percent.

Historic to current period significant trends would reverse for 53 percent of the communities. However, historic to current significant declines would continue for: late-seral single-layer lower montane and subalpine, and upland shrubland. Conversely, an historic to current significant increasing trend would continue for exotic herbland and mid-seral lower montane forest communities.

Under Alternative 2, the areal extents of approximately 67 percent of the terrestrial communities on all lands in the Eastside EIS area of the Basin would not likely occur within their historical ranges in 100 years (table 2.30).

Eastside EIS: BLM- and FS-administered Lands —We detected ecologically significant class changes between current and year 100 for 58 percent of the terrestrial communities in this region and stratum (table 2.31). There would be increases of more than 100 percent in the areal extent of three communities: early-seral lower montane forest, exotic herbland, and upland herbland. However, declines of more than 50 percent would occur in the areas of three late-seral single-layer communities: montane, lower montane, and subalpine.

Historic to current significant trends would reverse for 67 percent of the communities. However, historic to current significant declines would continue for two communities: late-seral single-layer lower montane and subalpine forest types. Conversely, an historic to current significant increasing trend would continue for exotic herblands.

Under Alternative 2, the areal extents of 58 percent of the terrestrial communities on BLM- and FS-administered lands in the Eastside EIS area of the Basin would not likely occur within their historical ranges in 100 years (table 2.32).

Table 2.31 — Historical and future trends[1] of the areal extent of terrestrial communities for BLM- and FS-administered lands within the Eastside EIS. Values are expressed as percent change.

Terrestrial Community	Historical Trend	Alt. 1 Yr. 100	Alt. 2 Yr. 100	Alt. 3 Yr. 100	Alt. 4 Yr. 100	Alt. 5 Yr. 100	Alt. 6 Yr. 100	Alt. 7 Yr. 100
Alpine	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Early-seral Montane Forest	73.3	-44.5	-47.0	-33.7	-34.6	-33.5	-35.1	-42.0
Early-seral Lower Montane Forest	-44.0	320.5	265.3	385.7	391.0	387.3	388.8	217.3
Early-seral Subalpine Forest	232.0	-41.3	-42.8	-17.7	-17.9	-20.9	-21.2	-45.6
Exotic Herbland[2]	N/A[3]	116.6	506.0	-40.4	-49.8	-10.0	-40.9	-2.3
Late-seral Montane Forest Multi-layer	133.9	-29.6	-11.9	-17.5	-16.7	-20.1	-15.9	-0.8
Late-seral Montane Forest Single-layer	151.8	-89.2	-87.1	-73.8	-73.9	-75.4	-74.6	-72.3
Late-seral Lower Montane Forest Multi-layer	4.9	71.0	89.2	-5.9	-6.0	-4.5	-5.3	129.8
Late-seral Lower Montane Forest Single-layer	-75.8	-40.5	-50.0	169.5	169.2	164.1	166.1	-40.0
Late-seral Subalpine Forest Multi-layer	-36.1	85.2	99.1	68.0	71.8	71.2	78.6	164.4
Late-seral Subalpine Forest Single-layer	-31.7	-57.9	-56.2	-62.4	-64.1	-62.4	-63.8	-68.5
Mid-seral Montane Forest	17.8	15.1	15.4	9.6	9.4	10.6	9.2	5.1
Mid-seral Lower Montane Forest	-3.6	55.0	34.8	-8.5	-8.4	-6.2	-7.6	2.5
Mid-seral Subalpine Forest	-72.1	92.9	91.0	42.5	43.5	49.2	47.5	87.6
Rock/Barren	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Upland Herbland	-30.1	284.4	155.2	350.8	409.0	331.3	388.5	336.0
Upland Shrubland	-7.6	-22.1	-28.9	-18.9	-22.1	-18.7	-21.2	-21.0
Upland Woodland	27.6	-15.1	-11.3	-33.7	-37.2	-33.4	-35.7	-11.2
Urban	N/A	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

[1]Historical trend = percent change between historical and current periods.
Future trend = percent change between current period and year 100 for each alternative.

[2]Amount adjusted in Alternative 2 due to errors in modeling.

[3]N/A = Not Applicable.

Table 2.32 — Areal extent (percentage) of terrestrial communities for minimum, maximum and initial historical; current; and future projections for year 100, for the preliminary draft EIS alternatives on BLM- and FS-administered lands within the Eastside EIS area.

Terrestrial Community	Historical Minimum	Historical Maximum	Historical Initial	Current Level	Alt. 1 Yr. 100	Alt. 2 Yr. 100	Alt. 3 Yr. 100	Alt. 4 Yr. 100	Alt. 5 Yr. 100	Alt. 6 Yr. 100	Alt. 7 Yr. 100
	Percentage										
Agricultural	0.0	0.0	0.0	16.1	15.6	15.6	15.6	15.6	15.6	15.6	15.6
Alpine	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Early-seral Montane Forest	6.2	10.0	6.2	10.7	6.0	5.7	7.1	7.0	7.1	7.0	6.2
Early-seral Lower Montane Forest	0.8	3.7	0.8	0.4	1.8	1.5	2.1	2.1	2.1	2.1	1.3
Early-seral Subalpine Forest	0.4	0.9	0.4	1.4	0.8	0.8	1.2	1.2	1.1	1.1	0.8
Exotic Herbland[1]	0.0	0.0	0.0	1.5	3.3	3.3	0.9	0.8	1.4	0.9	1.5
Late-seral Montane Forest Multi-layer	3.8	6.3	3.8	8.8	6.2	7.8	7.3	7.3	7.0	7.4	8.7
Late-seral Montane Forest Single-layer	0.7	1.3	0.7	1.8	0.2	0.2	0.5	0.5	0.4	0.5	0.5
Late-seral Lower Montane Forest Multi-layer	2.1	3.8	3.3	3.5	6.0	6.6	3.3	3.3	3.3	3.3	8.0
Late-seral Lower Montane Forest Single-layer	6.5	11.2	11.2	2.7	1.6	1.3	7.3	7.3	7.1	7.2	1.6
Late-seral Subalpine Forest Multi-layer	0.8	1.7	0.8	0.5	1.0	1.1	0.9	0.9	0.9	1.0	1.4
Late-seral Subalpine Forest Single-layer	0.2	0.4	0.4	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Mid-seral Montane Forest	9.4	10.3	9.5	11.3	12.9	13.0	12.3	12.3	12.4	12.3	11.8
Mid-seral Lower Montane Forest	4.2	8.0	8.0	7.7	11.9	10.4	7.1	7.1	7.2	7.1	7.9
Mid-seral Subalpine Forest	1.6	3.3	3.3	0.9	1.8	1.8	1.3	1.3	1.4	1.4	1.8
Riparian Herbland[2]	0.0	0.5	—	—	0.1	0.1	0.1	0.1	0.1	0.1	0.3
Riparian Shrubland[2]	0.1	0.3	—	—	0.6	0.6	0.6	0.6	0.6	0.6	0.2
Riparian Woodland[2]	0.1	0.1	—	—	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Rock/Barren	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Upland Herbland	3.8	17.1	3.8	2.7	10.3	6.8	12.0	13.6	11.5	13.0	11.6
Upland Shrubland	30.2	43.2	43.2	39.9	31.1	28.4	32.4	31.1	32.4	31.5	31.5
Upland Woodland	2.0	3.1	3.1	4.0	3.4	3.5	2.6	2.5	2.6	2.5	3.5
Urban	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6

[1]Amount adjusted in Alternative 2 due to errors in modeling.

[2]Due to problems with resolution of historic mapping, the historic to current trend is not applicable. However, the future changes are somewhat useful if used as trends.

Table 2.33 — Historical and future trends[1] of the areal extent of terrestrial communities for all ownerships within the Upper Columbia River Basin. Values are expressed as percent change.

Terrestrial Community	Historical Trend	Alt. 1 Yr. 100	Alt. 2 Yr. 100	Alt. 3 Yr. 100	Alt. 4 Yr. 100	Alt. 5 Yr. 100	Alt. 6 Yr. 100	Alt. 7 Yr. 100
Agricultural	0.0	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.9
Alpine	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Early-seral Montane Forest	-19.8	-8.2	9.5	-0.6	-2.6	-0.9	-5.8	6.8
Early-seral Lower Montane Forest	-86.8	541.0	395.4	635.3	636.7	620.6	596.6	402.5
Early-seral Subalpine Forest	19.5	-43.3	-44.4	-8.1	-7.6	-24.7	-26.8	-51.0
Exotic Herbland[2]	0.0	21.7	21.7	-28.7	-28.7	-1.0	-35.2	-6.4
Late-seral Montane Forest Multi-layer	-57.0	146.4	193.5	192.6	201.5	180.4	210.5	257.2
Late-seral Montane Forest Single-layer	-54.8	3.0	57.7	68.6	77.7	72.0	85.5	116.9
Late-seral Lower Montane Forest Multi-layer	-67.4	503.4	463.8	366.8	367.2	389.4	392.5	471.9
Late-seral Lower Montane Forest Single-layer	-94.8	340.5	383.2	1063.3	1062.6	960.2	928.3	530.2
Late-seral Subalpine Forest Multi-layer	-63.6	341.3	352.5	295.4	304.8	318.8	341.5	441.8
Late-seral Subalpine Forest Single-layer	50.7	-55.9	-55.2	-55.6	-55.5	-55.4	-55.9	-62.1
Mid-seral Montane Forest	64.5	-27.8	-33.3	-33.5	-34.0	-31.7	-32.9	-40.1
Mid-seral Lower Montane Forest	59.6	28.6	12.0	5.5	5.3	8.0	6.7	4.4
Mid-seral Subalpine Forest	21.7	-17.6	-24.2	-27.0	-26.1	-26.1	-24.4	-24.2
Rock/Barren	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Upland Herbland	-54.7	25.9	12.0	35.2	38.0	25.5	35.9	43.8
Upland Shrubland	-29.8	-13.3	-14.8	-9.9	-10.5	-10.8	-9.0	-11.8
Upland Woodland	-34.4	173.0	176.4	168.4	167.2	175.1	175.1	112.0
Urban	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water	-0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0

[1]Historical trend = percent change between historical and current periods.
Future trend = percent change between current period and year 100 for each alternative.

[2]Amount adjusted in Alternative 2 due to errors in modeling.

Table 2.34 — Areal extent (percentage) of terrestrial communities for minimum, maximum, and initial historical; current; and future projections for year 100 for preliminary draft EIS alternatives for all ownerships within the Upper Columbia River Basin.

Terrestrial Community	Historical Minimum	Historical Maximum	Historical Initial	Current Level	Alt. 1 Yr. 100	Alt. 2 Yr. 100	Alt. 3 Yr. 100	Alt. 4 Yr. 100	Alt. 5 Yr. 100	Alt. 6 Yr. 100	Alt. 7 Yr. 100
	Percentage										
Agricultural	0.0	0.0	0.0	12.5	12.2	12.2	12.2	12.2	12.2	12.2	12.2
Alpine	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Early-seral Montane Forest	8.4	11.3	11.3	9.1	8.3	9.9	9.0	8.8	9.0	8.5	9.7
Early-seral Lower Montane Forest	1.5	2.1	1.5	0.2	1.3	1.0	1.5	1.5	1.4	1.4	1.0
Early-seral Subalpine Forest	1.1	2.2	2.2	2.7	1.5	1.5	2.5	2.5	2.0	2.0	1.3
Exotic Herbland[1]	0.0	0.0	0.0	2.6	2.6	4.3	1.9	1.9	2.6	1.7	2.5
Late-seral Montane Forest Multi-layer	4.8	8.6	4.8	2.1	5.1	6.0	6.0	6.2	5.8	6.4	7.3
Late-seral Montane Forest Single-layer	1.0	2.1	1.0	0.5	0.5	0.7	0.8	0.8	0.8	0.9	1.0
Late-seral Lower Montane Forest Multi-layer	1.3	1.8	1.8	0.6	3.5	3.3	2.7	2.7	2.8	2.9	3.3
Late-seral Lower Montane Forest Single-layer	2.7	4.0	2.8	0.1	0.6	0.7	1.7	1.7	1.5	1.5	0.9
Late-seral Subalpine Forest Multi-layer	1.6	3.7	1.6	0.6	2.6	2.6	2.3	2.4	2.4	2.6	3.2
Late-seral Subalpine Forest Single-layer	0.3	0.9	0.9	1.4	0.6	0.6	0.6	0.6	0.6	0.6	0.5
Mid-seral Montane Forest	13.0	16.8	14.3	23.5	16.9	15.7	15.6	15.5	16.0	15.7	14.1
Mid-seral Lower Montane Forest	3.4	4.2	3.7	6.0	7.7	6.7	6.3	6.3	6.5	6.4	6.2
Mid-seral Subalpine Forest	3.2	3.7	3.6	4.4	3.6	3.3	3.2	3.2	3.2	3.3	3.3
Riparian Herbland[2]	0.2	1.0	—	—	0.1	0.2	0.1	0.1	0.1	0.1	0.1
Riparian Shrubland[2]	0.4	0.8	—	—	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Riparian Woodland[2]	1.2	1.6	—	—	0.8	1.0	0.9	0.9	0.9	0.9	1.1
Rock/Barren	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Upland Herbland	12.3	17.2	13.1	5.9	7.4	6.6	8.0	8.2	7.4	8.0	8.5
Upland Shrubland	24.8	32.5	32.5	22.8	19.8	19.5	20.6	20.4	20.4	20.8	20.1
Upland Woodland	1.5	1.8	1.5	1.0	2.7	2.7	2.6	2.6	2.7	2.7	2.1
Urban	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Water	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7

[1]Amount adjusted in Alternative 2 due to errors in modeling.

[2]Due to problems with resolution of historic mapping, the historic to current trend is not applicable. However, the future changes are somewhat useful if used as trends.

Table 2.35 — Historical and future trends[1] of the areal extent of terrestrial communities for BLM- and FS-administered lands within the Upper Columbia River Basin. Values are expressed as percent change.

Terrestrial Community	Historical Trend	Alt. 1 Yr. 100	Alt. 2 Yr. 100	Alt. 3 Yr. 100	Alt. 4 Yr. 100	Alt. 5 Yr. 100	Alt. 6 Yr. 100	Alt. 7 Yr. 100
Alpine	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Early-seral Montane Forest	-13.5	-9.9	-16.8	0.8	-2.1	0.3	-5.5	-17.1
Early-seral Lower Montane Forest	-81.0	389.1	275.1	507.6	509.4	489.1	459.0	284.0
Early-seral Subalpine Forest	17.1	-45.4	-44.2	-6.4	-5.8	-24.8	-27.1	-51.4
Exotic Herbland[2]	N/A[3]	-1.4	-1.4	-77.6	-77.6	-35.8	-73.5	-62.0
Late-seral Montane Forest Multi-layer	-43.9	100.6	168.4	153.9	164.2	139.8	174.6	242.0
Late-seral Montane Forest Single-layer	-62.1	20.9	104.0	125.4	139.9	130.7	152.2	198.3
Late-seral Lower Montane Forest Multi-layer	-42.0	246.5	286.8	93.0	93.4	118.4	121.9	296.0
Late-seral Lower Montane Forest Single-layer	-92.1	393.6	219.3	1470.0	1468.9	1316.4	1268.6	437.9
Late-seral Subalpine Forest Multi-layer	-57.0	283.5	303.9	236.0	245.7	260.2	283.7	396.1
Late-seral Subalpine Forest Single-layer	40.9	-55.2	-54.6	-54.9	-54.8	-54.6	-55.1	-62.3
Mid-seral Montane Forest	37.7	-21.2	-23.6	-30.0	-30.7	-27.2	-29.1	-34.1
Mid-seral Lower Montane Forest	30.3	50.9	26.5	-0.9	-1.1	4.9	2.0	9.6
Mid-seral Subalpine Forest	20.3	-21.3	-23.6	-32.2	-31.1	-31.1	-29.1	-23.6
Rock/Barren	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Upland Herbland	-16.0	21.1	-5.2	36.9	41.8	20.4	33.4	71.4
Upland Shrubland	-7.7	-10.1	-12.2	-5.6	-6.4	-6.8	-5.7	-10.6
Upland Woodland	-50.4	190.3	196.2	182.3	180.3	193.9	193.5	85.3
Urban	N/A	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

[1]Historical trend = percent change between historical and current periods.
Future trend = percent change between current period and year 100 for each alternative.

[2]Amount adjusted in Alternative 2 due to errors in modeling.

[3]NA = Not Applicable.

Table 2.36 — Areal extent (percentage) of terrestrial communities for minimum, maximum, and initial historical; current; and future projections for year 100 for preliminary draft EIS alternatives for BLM- and FS-administered lands within the Upper Columbia River Basin.

Terrestrial Community	Historical Minimum	Historical Maximum	Historical Initial	Current Level	Alt. 1 Yr. 100	Alt. 2 Yr. 100	Alt. 3 Yr. 100	Alt. 4 Yr. 100	Alt. 5 Yr. 100	Alt. 6 Yr. 100	Alt. 7 Yr. 100
	Percentage										
Alpine	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Early-seral Montane Forest	9.3	12.6	12.6	10.9	9.8	9.1	11.0	10.7	10.9	10.3	9.0
Early-seral Lower Montane Forest	1.2	1.8	1.4	0.3	1.3	1.0	1.6	1.6	1.6	1.5	1.0
Early-seral Subalpine Forest	1.6	3.5	3.5	4.1	2.2	2.3	3.8	3.8	3.0	3.0	2.0
Exotic Herbland[1]	0.0	0.0	0.0	2.9	2.9	2.9	0.7	0.7	1.9	0.8	1.1
Late-seral Montane Forest Multi-layer	5.3	10.1	5.3	3.0	6.0	8.0	7.6	7.9	7.2	8.2	10.2
Late-seral Montane Forest Single-layer	1.3	2.3	1.3	0.5	0.6	1.0	1.1	1.2	1.1	1.2	1.5
Late-seral Lower Montane Forest Multi-layer	1.1	1.6	1.5	0.9	3.0	3.4	1.7	1.7	1.9	1.9	3.4
Late-seral Lower Montane Forest Single-layer	2.1	3.7	2.1	0.2	0.8	0.5	2.6	2.6	2.3	2.3	0.9
Late-seral Subalpine Forest Multi-layer	2.2	5.2	2.2	0.9	3.6	3.8	3.2	3.3	3.4	3.6	4.7
Late-seral Subalpine Forest Single-layer	0.5	1.5	1.5	2.1	0.9	0.9	0.9	0.9	0.9	0.9	0.8
Mid-seral Montane Forest	15.6	20.9	18.7	25.7	20.3	19.7	18.0	17.8	18.7	18.3	17.0
Mid-seral Lower Montane Forest	2.9	3.9	3.5	4.5	6.8	5.7	4.5	4.5	4.7	4.6	4.9
Mid-seral Subalpine Forest	4.5	5.5	5.3	6.4	5.0	4.9	4.3	4.4	4.4	4.5	4.9
Riparian Herbland[2]	0.0	0.2	—	—	0.1	0.2	0.1	0.1	0.1	0.1	0.1
Riparian Shrubland[2]	0.1	0.1	—	—	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Riparian Woodland[2]	0.9	1.0	—	—	0.7	1.0	0.9	0.8	0.8	0.8	0.7
Rock/Barren	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Upland Herbland	6.9	12.7	6.9	5.8	7.0	5.5	8.0	8.3	7.0	7.8	10.0
Upland Shrubland	23.7	30.3	30.3	28.0	25.1	24.6	26.4	26.2	26.1	26.4	25.0
Upland Woodland	1.6	1.9	1.9	1.0	2.8	2.8	2.7	2.7	2.8	2.8	1.8
Urban	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

[1] Amount adjusted in Alternative 2 due to errors in modeling.

[2] Due to problems with resolution of historic mapping, the historic to current trend is not applicable. However, the future changes are somewhat useful if used as trends.

Upper Columbia River Basin: All Ownerships —We detected ecologically significant class changes between current and year 100 for 62 percent of the terrestrial communities in this region and stratum (table 2.33). The areal extent of six communities would increase by more than 100 percent, whereas there would be declines of at least 50 percent in the areas of three communities: late-seral subalpine single-layer forest, and riparian herbland and riparian woodland.

Historic to current significant trends would reverse for 68 percent of the communities, whereas historic to current significant declines would continue for three others: riparian herbland and riparian woodland, and upland shrubland. Conversely, an historic to current significant increasing trend would continue for exotic herblands and mid-seral lower montane forest types.

Under Alternative 2, the areal extents of 58 percent of the terrestrial communities on all lands in the Upper Columbia River Basin would not likely occur within their historical ranges in 100 years (table 2.34).

Upper Columbia River Basin: BLM- and FS-administered Lands —We detected ecologically significant class changes between current and year 100 for 62 percent of the terrestrial communities in this region and stratum (table 2.35). Seven communities would increase by more than 100 percent, whereas the late-seral subalpine single-layer forest community would decrease by more than 50 percent.

Historic to current significant trends would reverse for 73 percent of the communities. Historic to current significant increasing trends would continue for exotic herblands and mid-seral lower montane forests.

Under Alternative 2, the areal extents of at least 50 percent of the terrestrial communities on BLM- and FS-administered lands in the Upper Columbia River Basin would not likely occur within their historic ranges in 100 years (table 2.36).

Alternative 3

ICBEMP Assessment Area: All Ownerships —Alternative 3 would result in ecologically significant trends across 54 percent of the terrestrial communities in this region and stratum (table 2.25). Five communities would increase by approximately 100 percent or more, whereas there would be declines of more than 50 percent in three communities: late-seral single-layer subalpine forest, and the riparian herbland and riparian woodland types.

Trends would reverse for 9 of 17 communities that had significant historic to current trends. Significant losses would continue for all three riparian communities and the upland shrubland. An increasing trend of the exotic herblands and upland woodlands would continue.

Under Alternative 3, the areal extents of 71 percent of the communities on all lands in the Basin would not likely occur within their historical range by year 100 (table 2.26).

ICBEMP Assessment Area: BLM- and FS-administered Lands —We detected ecologically significant trends across 50 percent of the terrestrial communities in this region and stratum (table 2.27). There would be increases of more than 100 percent in four communities: early-seral montane, late-seral lower montane single layer, late-seral subalpine multi-layer, and upland herbland. Conversely, there would be decreases of more than 50 percent in two other communities: exotic herblands and the late-seral single-layer subalpine forest type.

Trends would reverse for 82 percent of the communities that had historic to current significant changes.

Under Alternative 3, the areal extents of 42 percent of the terrestrial communities on BLM- and FS-administered lands in the Basin would not likely occur within their historical ranges by year 100 (table 2.28).

Eastside EIS: All Ownerships —We detected ecologically significant class changes between current and year 100 for 58 percent of the terrestrial communities in this region and stratum (table 2.29). There would be increases of more than 100 percent in the areal extent of four communities: early-seral lower montane, exotic herbland, late-seral multi-layer lower montane, and upland herbland. Conversely, the late-seral single-layer montane and subalpine types would decrease by at least 50 percent.

Historic to current significant trends would reverse for 63 percent of the communities. However, historic to current significant declines would continue for two communities: late-seral single-layer subalpine, and upland shrubland. Conversely, an historic to current significant increasing trend would continue for the exotic herbland community.

Under Alternative 3, the areal extents of 75 percent of the terrestrial communities on all lands in the Eastside EIS area of the Basin would not likely occur within their historical ranges in 100 years (table 2.30).

Eastside EIS: BLM- and FS-administered Lands —We detected ecologically significant class changes between current and year 100 for half of the terrestrial communities in this region and stratum (table 2.31). The areal extent would increase by more than 100 percent in three communities: early-seral lower montane forest, late-seral single-layer lower montane, and upland herbland. There would be declines of more than 50 percent in two communities: late-seral single-layer montane and subalpine forest types.

Historic to current significant trends would reverse for 73 percent of the communities. Historic to current significant declines would continue for the late-seral single-layer subalpine forest type.

Under Alternative 3, the areal extents of 42 percent of the terrestrial communities on BLM- and FS-administered lands within the Eastside EIS area of the Basin would not likely occur within their historical ranges in 100 years (table 2.32).

Upper Columbia River Basin: All Ownerships —We detected ecologically significant class changes between current and year 100 for 63 percent of the terrestrial communities in this region and stratum (table 2.33). There would be increases of more than 100 percent in the areal extents of six communities: early-seral lower montane forest; late-seral multi-layer montane, lower montane, and subalpine; late-seral single-layer lower montane; and upland woodland. In fact, late-seral single-layer lower montane would increase by more than 1,000 percent. Conversely, there would be at least 50 percent declines in three communities: late-seral single-layer subalpine forest, and the riparian herbland and riparian woodland types.

Historic to current significant trends would reverse for 74 percent of the communities. However, historic to current period significant declines would continue for three communities: riparian herbland and riparian woodland types, and upland shrubland. Conversely, the historic to current increasing trend for the mid-seral lower montane would continue.

Under Alternative 3, the areal extents of 62 percent of the terrestrial communities on all lands in the Upper Columbia River Basin would not likely occur within their historical ranges in 100 years (table 2.34).

Upper Columbia River Basin: BLM- and FS-administered Lands —We detected ecologically significant class changes between current and year 100 for 58 percent of the terrestrial communities in this region and stratum (table 2.35). The areal extents of six communities would increase by more than 100 percent; in fact, the late-seral single-layer lower montane forest community would increase by almost 1,500 percent. Conversely, the exotic herbland and late-seral single-layer subalpine forest would decrease by approximately 50 percent or more.

Historic to current period significant trends would reverse for 87 percent of the communities.

Under Alternative 3, the areal extents of 42 percent of the terrestrial communities on BLM- and FS-administered lands in the Upper Columbia River Basin would not likely occur within their historical ranges in 100 years (table 2.36).

Alternative 4

ICBEMP Assessment Areas: All Ownerships — Ecologically significant trends between the current period and year 100 were detected for 58 percent of the terrestrial communities in this region and stratum (table 2.25). Five communities would increase by more than 100 percent, whereas decreases of more than 50 percent would be expected in three communities: late-seral single-layer subalpine forest, and the riparian herbland and riparian woodland types.

Trends would reverse for 59 percent of the communities that had significant trends from historic to current. Historic to current period significant declines would be expected to continue in all three riparian communities and the upland shrubland type, whereas increases would be expected to continue in the exotic herbland community.

Under Alternative 4, 71 percent of the terrestrial communities on all lands in the Basin would not likely occur at levels within their historical ranges in 100 years (table 2.26).

ICBEMP Assessment Area: BLM- and FS-administered Lands — Under Alternative 4, we detected ecologically significant trends for 54 percent of the communities (table 2.27). There would be increases of at least 100 percent in the areal extents of four communities: early-seral lower montane, late-seral single-layer lower montane, late-seral multi-layer subalpine, and upland herbland. Conversely, there would be decreases of nearly 50 percent or more in two communities: exotic herbland and the late-seral single-layer subalpine forest type.

Trends for 9 of the 11 communities that had significant historic to current period changes would reverse.

Under Alternative 4, the areal extents of 42 percent of the communities on BLM- and FS-administered lands in the Basin would be expected to occur outside of their predicted historical range in 100 years (table 2.28).

Eastside EIS: All Ownerships —We detected ecologically significant class changes between current and year 100 for 58 percent of the terrestrial communities in this region and stratum (table 2.29). There would be increases of more than 100 percent in the areal extent of four communities: early-seral lower montane, exotic herbland, late-seral multi-layer lower montane, and upland herbland. The areas of late-seral single-layer montane and subalpine types would decrease by at least 50 percent.

Historic to current significant trends would reverse for 63 percent of the communities. However, historic to current significant declines would continue for five communities: late-seral single-layer subalpine, all three riparian types, and upland shrubland. Conversely, an historic to current significant increasing trend for the exotic herbland community would continue.

Under Alternative 4, the areal extents of 75 percent of the terrestrial communities on all lands in the Eastside EIS area within the Basin would not likely occur within their historical ranges in 100 years (table 2.30).

Eastside EIS: BLM- and FS-administered Lands —We detected ecologically significant class changes between current and year 100 for 54 percent of the terrestrial communities in this region and stratum (table 2.31). There would be increases of more than 100 percent in the areal extents of three communities: early-seral lower montane forest, late-seral single-layer lower montane, and upland herbland; whereas there would be declines of approximately 50 percent or more in three other communities: exotic herbland and late-seral single-layer montane and subalpine forest types.

While historic to current significant trends would reverse for 73 percent of the communities, historic to current significant declines would continue for the late-seral single-layer subalpine forest type.

Under Alternative 4, the areal extents of 42 percent of the terrestrial communities on BLM- and FS-administered lands within the Eastside EIS area of the Basin would not likely occur within their historical ranges in 100 years (table 2.32).

Upper Columbia River Basin: All Ownerships —We detected ecologically significant class changes between current and year 100 for 63 percent of the terrestrial communities in this region and stratum (table 2.33). Increases of more than 100 percent would be expected in the areal extents of six communities: early-seral lower montane forest; late-seral multi-layer montane, lower montane, and subalpine; late-seral single-layer lower montane; and the upland woodland. In fact, late-seral single-layer lower montane would increase more than 1,000 percent. Conversely, there would be declines of more than 50 percent in the late-seral single-layer subalpine forest type.

Historic to current significant trends would reverse for 74 percent of the communities. While historic to current significant declines would continue for the upland shrubland, the historic to current increasing trend would continue for the mid-seral lower montane forest type.

Under Alternative 4, the areal extents of 62 percent of the terrestrial communities on all lands in the Upper Columbia River Basin would not likely occur within their historical ranges in 100 years (table 2.34).

Upper Columbia River Basin: BLM- and FS-administered Lands —We detected ecologically significant class changes between current and year 100 for 58 percent of the terrestrial communities in this region and stratum (table 2.35). The areal extents of six communities would increase by more than 100 percent; in fact, the late-seral single-layer lower montane forest community would increase by nearly 1,500 percent. Conversely, the exotic herbland and late-seral single-layer subalpine forest communities would decrease by at least 50 percent.

Under Alternative 4, the areal extents of 42 percent of the terrestrial communities on BLM- and FS-administered lands in the Upper Columbia River Basin would not likely occur within their historical ranges in 100 years (table 2.36).

Alternative 5

ICBEMP Assessment Area: All Ownerships — In this region and stratum, 58 percent of the terrestrial communities were predicted to have significant ecological trends by year 100 of Alternative 5 (table 2.25). There would be increases between the current period and year 100 of more than 100 percent in four communities: early-seral lower montane forest, late-seral single- and multi-layer lower montane forest, and late-seral multi-layer subalpine forest. Conversely, three other communities would decline by at least 50 percent: late-seral single-layer subalpine forest, and the riparian herbland and riparian woodland types.

While trends would reverse for 59 percent of the communities that had significant historic to current period trends, declining trends would continue for all three riparian communities and the upland shrublands through year 100. The significant historic to current increasing trend of exotic herblands and upland woodlands would continue.

Under Alternative 5, the availabilities of 71 percent of the terrestrial communities on all lands in the Basin would not likely occur within their historical ranges by year 100 (table 2.26).

ICBEMP Assessment Area: BLM- and FS-administered lands —We observed ecologically significant trends for 54 percent of the terrestrial communities on BLM- and FS-administered lands in this region and stratum (table 2.27). Increases of more than 100 percent would occur between the current period and year 100 in three communities: early-seral and late-seral single-layer lower montane forest and the late-seral multi-layer subalpine forest. Conversely, decreases of more than 50 percent would occur in the late-seral single-layer subalpine forest type.

Under Alternative 5, the availability of 46 percent of the terrestrial communities on BLM- and FS-administered lands in the Basin would not likely

occur within their expected historical ranges in 100 years (table 2.28).

Eastside EIS: All Ownerships —We detected ecologically significant class changes between current and year 100 for 58 percent of the terrestrial communities in this region and stratum (table 2.29). The areal extents would increase by more than 100 percent in four communities: early-seral and late-seral multi-layer lower montane, exotic herblands and the upland herbland, whereas the late-seral single-layer montane and subalpine, as well as the riparian woodland type, would decrease by at least 50 percent.

Historic to current period significant trends would reverse for 63 percent of the communities. However, historic to current significant declines would continue for five communities: late-seral single-layer subalpine, all three riparian types, and the upland shrublands. Conversely, an historic to current significant increasing trend would continue for the exotic herbland community.

Under Alternative 5, the areal extents of 75 percent of the terrestrial communities of all lands in the Eastside EIS area of the Basin would not likely occur within their historical ranges in 100 years (table 2.30).

Eastside EIS: BLM- and FS-administered Lands —We detected ecologically significant class changes between current and year 100 of Alternative 5 for 54 percent of the terrestrial communities in this region and stratum (table 2.31). The areal extents would increase by more than 100 percent in three communities: early-seral and late-seral single-layer lower montane and the upland herbland; there would be declines of more than 50 percent in two other communities: late-seral single-layer montane and subalpine forest types.

Historic to current significant trends would reverse for 73 percent of the communities, but historic to current significant declines would continue for the late-seral single-layer subalpine forest type.

Under Alternative 5, the areal extents of 42 percent of the terrestrial communities on the BLM- and FS-administered lands within the Eastside EIS area of the Basin would not likely occur within their historical ranges in 100 years (table 2.32).

Upper Columbia River Basin: All Ownerships —We detected ecologically significant class changes between current and year 100 for 63 percent of the terrestrial communities in this region and stratum (table 2.33). The areal extents would increase by more than 100 percent in six communities: early-seral lower montane forest; late-seral multi-layer montane, lower montane, and subalpine; late-seral single-layer lower montane; and upland woodland. In fact, late-seral single-layer lower montane would increase by 960 percent. Conversely, areal extents would decline by more than 50 percent in three communities: late-seral single-layer subalpine forest, and the riparian herbland and riparian woodland types.

Historic to current significant trends would reverse for 74 percent of the communities. Historic to current significant declines would continue for only three communities: the riparian herbland and riparian woodland types and the upland shrubland. Conversely, the historic to current increasing trend for the mid-seral lower montane would continue through year 100.

Under Alternative 5, the areal extents of 58 percent of the terrestrial communities on all lands in the Upper Columbia River Basin would not likely occur within their historical ranges in 100 years (table 2.34).

Upper Columbia River Basin: BLM- and FS-administered Lands —We detected ecologically significant class changes between current and year 100 for 62 percent of the terrestrial communities in this region and stratum (table 2.35). The areal extents of seven communities would increase by more than 100 percent; in fact, the late-seral single-layer lower montane forest community would increase by approximately 1,300 percent. Conversely, the late-seral single-layer subalpine forest type would decrease by at least 50 percent.

Historic to current significant trends would reverse for 73 percent of the communities. However, the significant historical increase of the mid-seral lower montane forest would continue through year 100.

Under Alternative 5, the areal extents of 38 percent of the terrestrial communities on BLM- and FS-administered lands in the Upper Columbia River Basin would not likely occur within their historical ranges in 100 years (table 2.36).

Alternative 6

<u>ICBEMP Assessment Area: All Ownerships</u> — Ecologically significant trends were observed across 50 percent of all terrestrial communities within the Basin (table 2.25). The areal extent of five communities would increase by more than 100 percent: early-seral and late-seral single- and multi-layer lower montane, late-seral multi-layer subalpine, and upland herbland. Conversely, there would be decreases of at least 50 percent in three others: late-seral single-layer subalpine forest, and the riparian herbland and riparian woodland types.

Historic to current significant trends would reverse for 65 percent of the communities by year 100 of Alternative 6. However, all three riparian types and the upland shrubland communities would be expected to continue their historical declines through year 100. Conversely, the availability of exotic herblands and upland woodland communities would be expected to continue to increase.

Under Alternative 6, the availability of 67 percent of the terrestrial communities on all lands in the Basin would not likely occur within the expected historical ranges in 100 years (table 2.26).

<u>ICBEMP Assessment Area: BLM- and FS-administered Land</u> —We detected ecologically significant trends with 54 percent of the terrestrial communities on BLM- and FS-administered lands in this region and stratum (table 2.27). Four communities would increase by more than 100 percent: early-seral and late-seral single-layer lower montane forest, late-seral multi-layer subalpine, and upland herbland. Conversely, two communities would decrease by at least 50 percent: exotic herbland and late-seral single-layer subalpine forest.

Trends would reverse on 9 of 11 communities that had significant historical trends.

Under Alternative 6, the availabilities of 45 percent of the terrestrial communities on BLM- and FS-administered lands in the Basin would not likely occur within their expected historical ranges by year 100 (table 2.28).

<u>Eastside EIS: All Ownerships</u> —We detected ecologically significant class changes between current and year 100 for 63 percent of the terrestrial communities in this region and stratum (table 2.29). The areal extents of four communities would increase by more than 100 percent: early-seral lower montane, exotic herbland, late-seral multi-layer lower montane, and upland herbland; whereas the late-seral single-layer montane and subalpine types would decrease by at least 50 percent.

Historic to current significant trends would reverse for 63 percent of the communities. However, historic to current significant declines would continue for two others: late-seral single-layer subalpine, and the upland shrubland. Conversely, an historic to current significant increasing trend would continue for the exotic herbland community.

Under Alternative 6, the areal extents of 75 percent of the terrestrial communities on all lands within the Eastside EIS area of the Basin would not likely occur within their historical ranges in 100 years (table 2.30).

<u>Eastside EIS: BLM- and FS-administered Lands</u> —We detected ecologically significant class changes between current and year 100 of Alternative 6 for 58 percent of the terrestrial communities in this region and stratum (table 2.31). The areal extents of three communities would increase by more than 100 percent: early-seral and late-seral single-layer lower montane and the upland

herblands; whereas the area of two communities would decline by more than 50 percent: late-seral single-layer montane and subalpine forests.

Historic to current significant trends would reverse for 73 percent of the communities. However, historic to current significant decline would continue for late-seral single-layer subalpine forests.

Under Alternative 6, the areal extents of 42 percent of the terrestrial communities on BLM- and FS-administered lands within the Eastside EIS area of the Basin would not likely occur within their historical ranges in 100 years (table 2.32).

Upper Columbia River Basin: All Ownerships —We detected ecologically significant class changes between current and year 100 for 67 percent of the terrestrial communities in this region and stratum (table 2.33). Increases of more than 100 percent would occur in the areal extents of six communities: early-seral lower montane, late-seral multi-layer montane and subalpine, late-seral single- and multi-layer lower montane, and upland woodland. In fact, late-seral single-layer lower montane would increase by approximately 930 percent. Conversely, declines of more than 50 percent would occur in the area of three communities: late-seral single-layer subalpine forest, and the riparian herbland and riparian woodland types.

Historic to current significant trends would reverse for 74 percent of the communities. However, historic to current significant declines would continue for three others: riparian herbland and riparian woodland types, and the upland shrubland. Conversely, the historical increasing trend for the mid-seral lower montane would continue through year 100.

Under Alternative 6, the areal extents of 58 percent of the terrestrial communities on all lands in the Upper Columbia River Basin would not likely occur within their historical ranges in 100 years (table 2.34).

Upper Columbia River Basin: BLM- and FS-administered Lands —We detected ecologically significant class changes between current and year 100 for 63 percent of the terrestrial communities in this region and stratum (table 2.35). The areal extents of seven communities would increase by more than 100 percent; in fact, the late-seral single-layer lower montane forest community would increase by nearly 1,300 percent. Conversely, the exotic herblands and late-seral single-layer subalpine forest communities would decrease by at least 50 percent.

Historic to current significant trends would reverse for 80 percent of the communities. The significant historical increase of mid-seral lower montane forest would continue through year 100.

Under Alternative 6, the areal extents of 29 percent of the terrestrial communities on BLM- and FS-administered lands in the Upper Columbia River Basin would not likely occur within their historical ranges in 100 years (table 2.36).

Alternative 7

ICBEMP Assessment Area: All Ownerships — We detected ecologically significant trends for 50 percent of all terrestrial communities across the Basin (table 2.25). Increases of more than 200 percent would occur in three communities: early-seral and late-seral multi-layer lower montane forest, and late-seral multi-layer subalpine forest. Conversely, decreases of at least 50 percent would occur in three others: early-seral subalpine forest, late-seral single-layer subalpine forest, and riparian woodland. If we had had time to improve the simulation of this alternative, we believe the percentage increases and decreases would be dampened considerably (see the previous section on "Simulation Strategies").

Trends for 71 percent of the communities that had historic to current significant changes would reverse. However, all three riparian communities and the upland shrubland would continue to have significant declines through year 100. Conversely, the exotic herbland community would continue to increase.

Under Alternative 7, the areal extents of 54 percent of the communities on all lands in the Basin would not likely occur within their expected historical ranges by year 100 (table 2.26).

ICBEMP Assessment Area: BLM- and FS-administered Lands —We detected significant ecological trends across 54 percent of the terrestrial communities occurring on BLM- and FS-administered lands in this region and stratum (table 2.27). Four communities would increase by more than 100 percent: early-seral and late-seral multi-layer lower montane forest, late-seral multi-layer subalpine forest, and upland herbland. Conversely, two communities would decrease by at least 50 percent: early-seral and late-seral single-layer subalpine forests.

Trends would reverse for 8 of 11 communities that experienced significant historical trends.

Under Alternative 7, the areal extents of 42 percent of the communities on BLM- and FS-administered lands in the Basin would not likely occur within their historical ranges in 100 years (table 2.28).

Eastside EIS: All Ownerships —We detected ecologically significant class changes between current and year 100 for 58 percent of the terrestrial communities in this region and stratum (table 2.29). The areal extents of five communities would increase by more than 100 percent: early-seral and late-seral multi-layer lower montane, exotic herbland, late-seral multi-layer subalpine, and upland herbland. However, the late-seral single-layer communities of the montane and subalpine forests would decrease by at least 50 percent.

Historic to current significant trends would reverse for 63 percent of the communities. However, historic to current significant declines would continue for three communities: late-seral single-layer lower montane forest and subalpine forest, and upland shrubland types. Conversely, an historic to current significant increasing trend for the exotic herbland community would continue.

Under Alternative 7, the areal extents of 71 percent of the terrestrial communities on all lands within the Eastside EIS area of the Basin would not likely occur within their historical ranges after 100 years (table 2.30).

Eastside EIS: BLM- and FS-administered Lands —We detected ecologically significant class changes between current and year 100 of Alternative 7 for 58 percent of the terrestrial communities in this region and stratum (table 2.31). The areal extents of three communities would increase by more than 100 percent: early-seral and late-seral multi-layer lower montane forest, late-seral multi-layer subalpine forest and upland herbland. However, declines of more than 50 percent would occur in two communities: late-seral single-layer montane and subalpine forest types.

Historic to current significant trends would reverse for 73 percent of the communities. However, historic to current significant declines would continue for late-seral single-layer lower montane and subalpine forest types.

Under Alternative 7, the areal extents of 42 percent of the terrestrial communities on BLM- and FS-administered lands within the Eastside EIS area of the Basin would not likely occur within their historical ranges in 100 years (table 2.32).

Upper Columbia River Basin: All Ownerships —We detected ecologically significant class changes between current and year 100 for 63 percent of the terrestrial communities in this region and stratum (table 2.33). The areal extents of eight communities would increase by more than 100 percent, and further they would increase by more than 400 percent in five communities: early-seral, and late-seral single- and multi-layer lower montane forest; and late-seral multi-layer subalpine forest. Conversely, there would be declines of more than 50 percent in the area of four communities: early-seral and late-seral single-layer subalpine forest, and the riparian herbland and riparian woodland types.

Historic to current significant trends would reverse for 74 percent of the communities. However, historic to current significant declines would continue for three communities: the riparian

herbland and riparian woodland types, and upland shrubland. Conversely, the historical increasing trend for the mid-seral lower montane would continue through year 100.

Under Alternative 7, the areal extents of 58 percent of the terrestrial communities on all lands in the Upper Columbia River Basin would not likely occur within their historical ranges in 100 years (table 2.34).

Upper Columbia River Basin: BLM- and FS-administered Lands —We detected ecologically significant class changes between current and year 100 for 71 percent of the terrestrial communities in this region and stratum (table 2.35). The areal extents of six communities would increase by more than 100 percent. Conversely, three communities would decrease by at least 50 percent: early-seral and late-seral single-layer subalpine and exotic herbland.

Historic to current significant trends would reverse for 80 percent of the communities. The significant historical increase of mid-seral lower montane forest would continue through year 100.

Under Alternative 7, the areal extents of 42 percent of the terrestrial communities on BLM- and FS-administered lands in the Upper Columbia River Basin would not likely occur within their historical ranges in 100 years (table 2.36).

Discussion

The initial historical estimates of community type area generally depict the Basin's composition during the latter 1800s. Although believed to be generally correct, the estimates represent only single points that are more like averages of the Basin's composition. Using this single historical estimate as a baseline to estimate the trend of a habitat area could give unrealistic results.

We believe that a comparison with an historical range, rather than a single point estimate, provides a more realistic accounting of habitat changes. We assume that native biota adapted to the historical dynamic landscapes. Further, we recognize that few, if any, species are solely dependent on the areal extent of a single vegetation community. Instead, we believe that the fitness of most species is more closely associated with the availability and juxtaposition of several, to many, community types within some geographical area.

Considering these factors and assumptions, we believe our coarse-filter approach of basing habitat change on an historical range provides a useful data set for estimating the persistence probabilities of native biota. *When the simulations project that a community type would occur well above its historical range, those species whose fitness is closely correlated with the availability of that type would have substantially fewer risks to their persistence. Conversely, when projection of a community type indicates a likelihood of occurrence well below its historical range within some geographical area, there would be probable substantial risks to the persistence of correlated species.*

Differences among the alternatives are discussed below by EIS area and terrestrial community. Comparisons are included about both ownership strata, including all lands and BLM- and FS-administered lands within each EIS area. Terrestrial communities are grouped by montane forests, subalpine forests, upland communities, riparian communities, and exotic herblands.

Alternative projections are not addressed for the Basin as a whole, nor for BLM-and FS-administered lands within the Basin. Also not addressed are differences among alternatives for the five communities that remained constant through our modeling projections: agriculture, alpine, barren/rock, urban, and water.

Additional detail about the treatment activities, disturbances, and subsequent transitions that provided a basis for our terrestrial community projections is included in this chapter in the discussion about vegetation response and disturbance patterns.

Because geographic and ownership stratum vary, the trends are often inconsistent between the Basin as a whole and the two EIS areas, and among the ownership strata of those regions. For example, trends of the mid-seral montane forest

community are substantially different between the Eastside EIS and the Upper Columbia River Basin analysis areas. In the Eastside EIS area as a whole, the areal extent of the mid-seral montane community type would decline between 4 and 14 percent for all alternative projections, whereas its area would increase across BLM- and FS-administered lands within the Eastside EIS area.

Similarly, in the Upper Columbia River Basin, the area of the mid-seral montane community would decline from 28 to 40 percent across the area as a whole, but declines across BLM- and FS-administered lands within the Upper Columbia River Basin would be less substantial, from 21 to 34 percent.

Eastside EIS Area

Montane Forests —

Early-Seral Lower Montane Forest. The 100-year projections of all alternatives would increase the areal extent of the early-seral lower montane forest community to a level within its historical range across all ownerships, and across BLM- and FS-administered lands within the Eastside EIS area (figure 2.29; tables 2.30 and 2.32). For both strata, Alternatives 3 through 6 had comparable projections for this community, followed in areal extent by Alternatives 1, 2, and 7.

Mid-seral Lower Montane Forest. For the Eastside EIS area as a whole, none of the alternatives would decrease mid-seral lower montane forest to a level within its historical range (figure 2.30; table 2.30). However, the 100-year projection for Alternatives 3 through 7 showed either a decrease or a very slight increase in the areal extent of this community, such that the projections were within the historical range across BLM- and FS-administered lands within the Eastside EIS (table 2.31 and 2.32). All restoration alternatives had comparable projections. Alternatives 1 and 2 had areal projections that exceeded the historical range on BLM- and FS-administered lands within the Eastside EIS area.

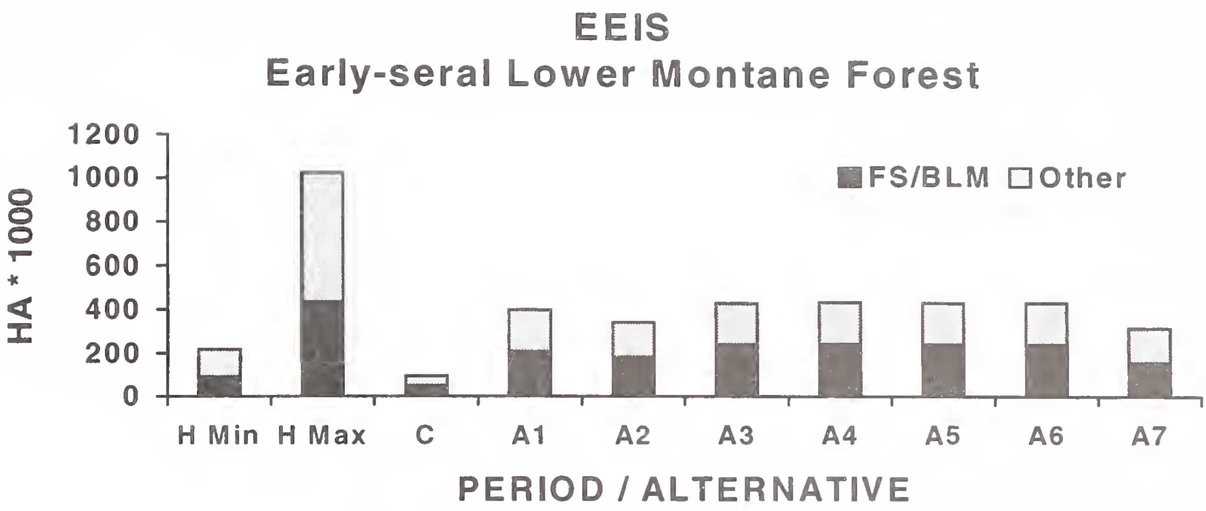
Late-seral Lower Montane Single-layer Forest. The 100-year projections of Alternatives 1, 2, and 7 would decrease the extent of this community and projections would lie below the historical range for both ownership strata (figure 2.31; tables 2.30 and 2.32). Alternatives 3 through 6, however, would increase this community's areal extent to within its historical range on BLM- and FS-administered lands within the Eastside EIS area, but projections for the alternatives across all ownerships still fell well below the historical range. There were no detectable measurable differences among Alternatives 3 through 6.

Late-seral Lower Montane Multi-layer Forest. The 100-year projections of this community's area across all ownerships within the Eastside EIS area were well above its historical range for all alternatives (figure 2.32; table 2.30). However, on BLM- and FS-administered lands, this community's areal extent would remain within its historical range for Alternatives 3 through 6 (table 2.32). Alternatives 1, 2, and 7 were projected to exceed the historical range of this community on BLM- and FS-administered lands.

Early-seral Montane Forest. All alternatives would decrease this community's areal extent from the current period (figure 2.33; tables 2.30 and 2.32). Across all ownerships, none of the alternative projections of this community type fell within its historical range. However, on BLM- and FS-administered lands, the 100-year projections for Alternatives 3 through 6 were within their historical range, whereas the outcomes for Alternatives 1, 2, and 7 were below.

Mid-seral Montane Forest. No alternative would be effective in reducing this community's areal extent to within its historical range across either ownership stratum within the Eastside EIS area (figure 2.34; tables 2.30 and 2.32). There were very few differences among the 100-year projections for any of the alternatives.

Late-seral Montane Single-layer Forest. All alternatives would significantly decrease this community's areal extent to a level well below its historical range (figure 2.35; tables 2.30 and 2.32). There were no substantial differences among the projections for Alternatives 3 through 7, which were somewhat higher than Alternatives 1 and 2.



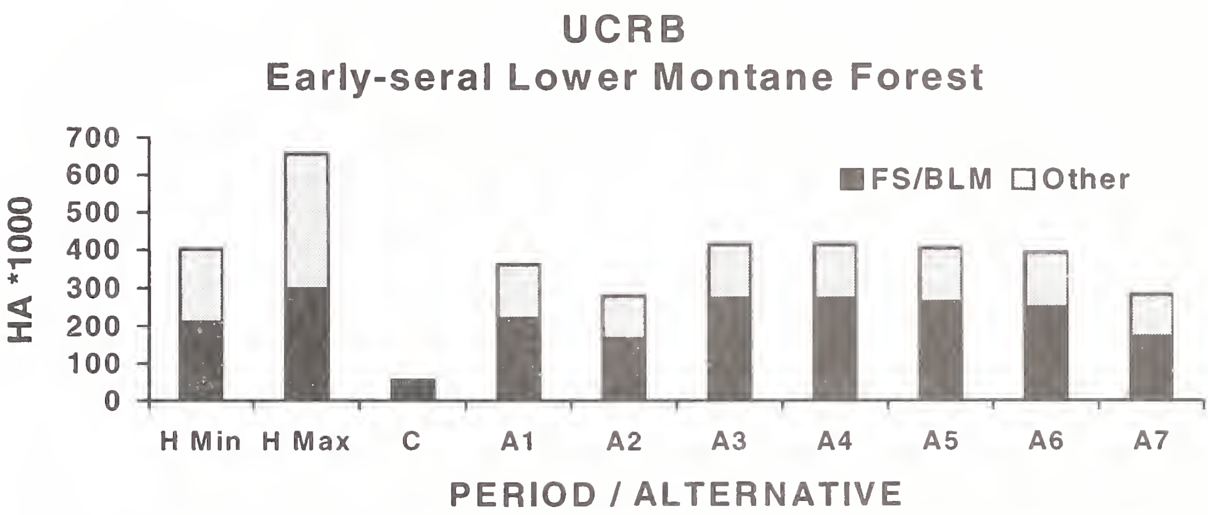
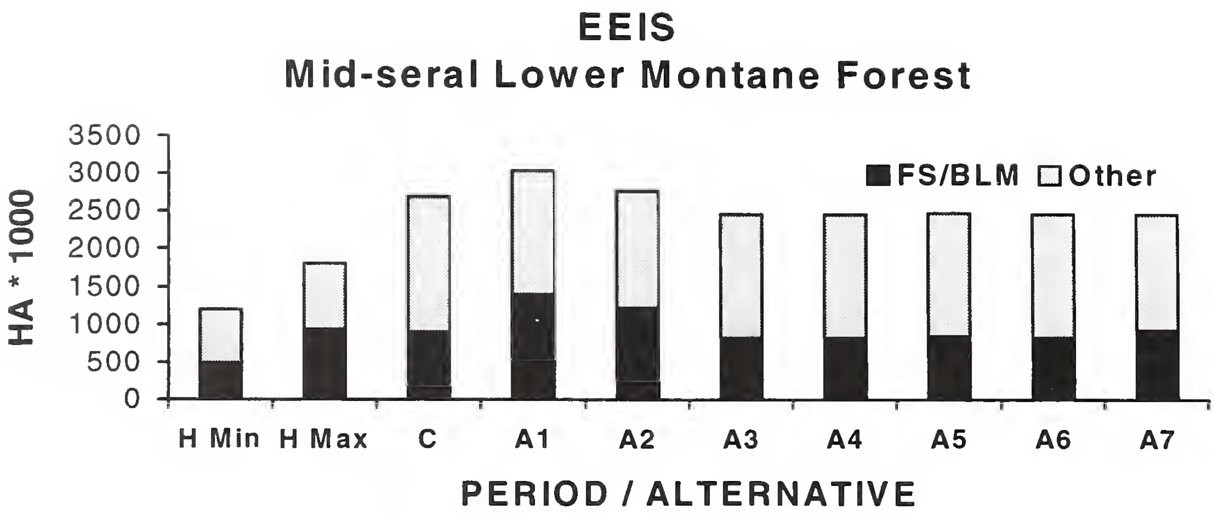


Figure 2.29 — Comparison of the historical range to current and future (100 year) projections for alternatives 1 through 7 for the early-seral lower montane forest community for the Eastside and Upper Columbia River Basin EIS areas.



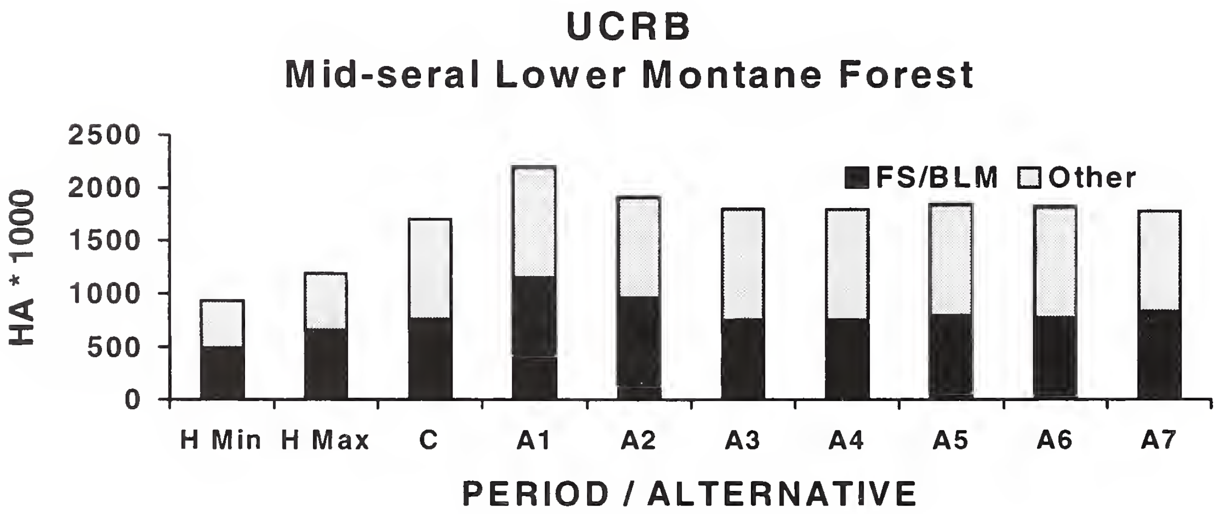


Figure 2.30 — Comparison of the historical range to current and future (100 year) projections for alternatives 1 through 7 for the mid-seral lower montane forest community for the Eastside and Upper Columbia River Basin EIS areas.

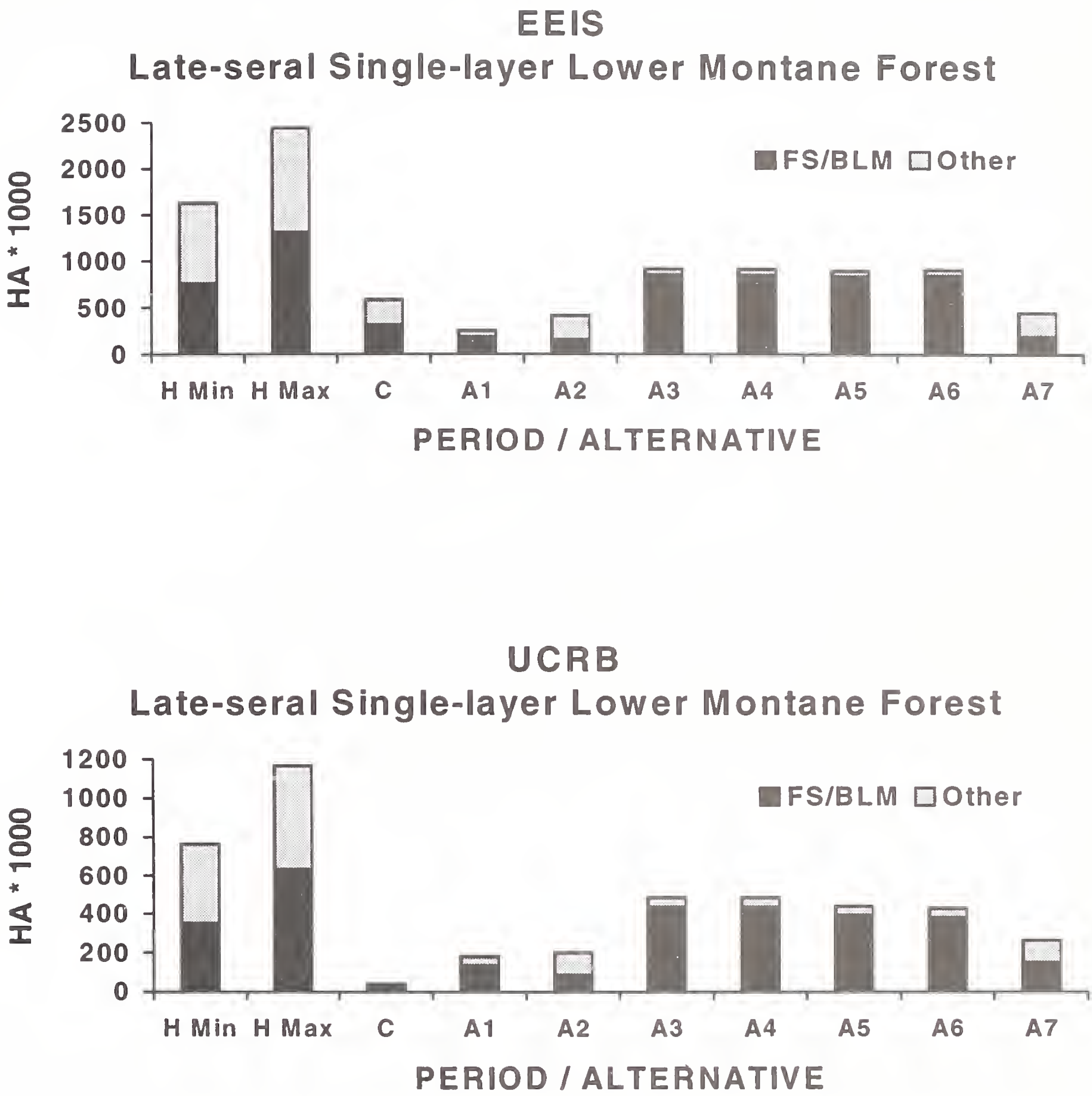


Figure 2.31 — Comparison of the historical range to current and future (100 year) projections for alternatives 1 through 7 for the late-seral single-layer lower montane forest community for the Eastside and Upper Columbia River Basin EIS areas.

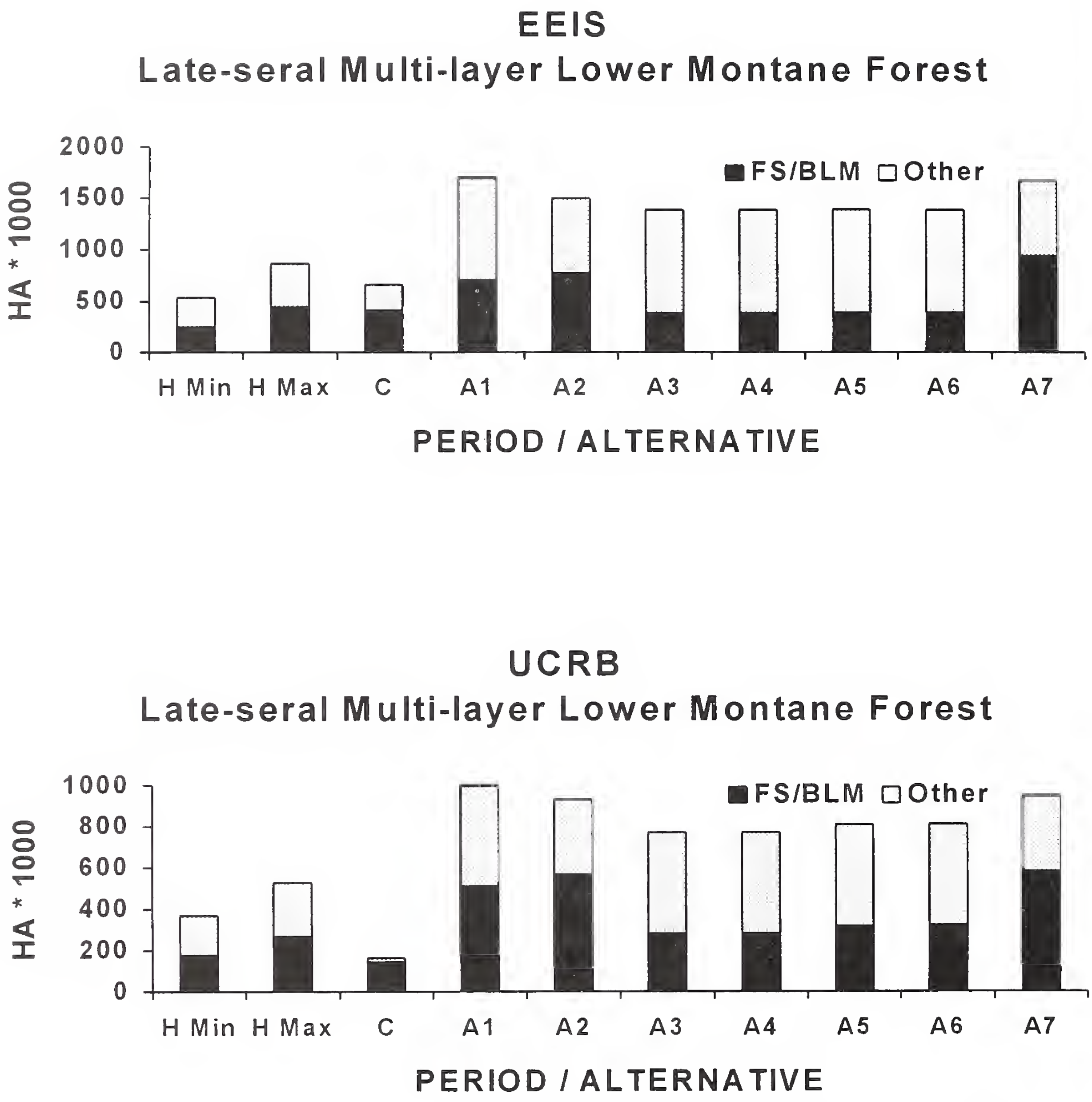


Figure 2.32 — Comparison of the historical range to current and future (100 year) projections for alternatives 1 through 7 for the late-seral multi-layer lower montane forest community for the Eastside and Upper Columbia River Basin EIS areas.

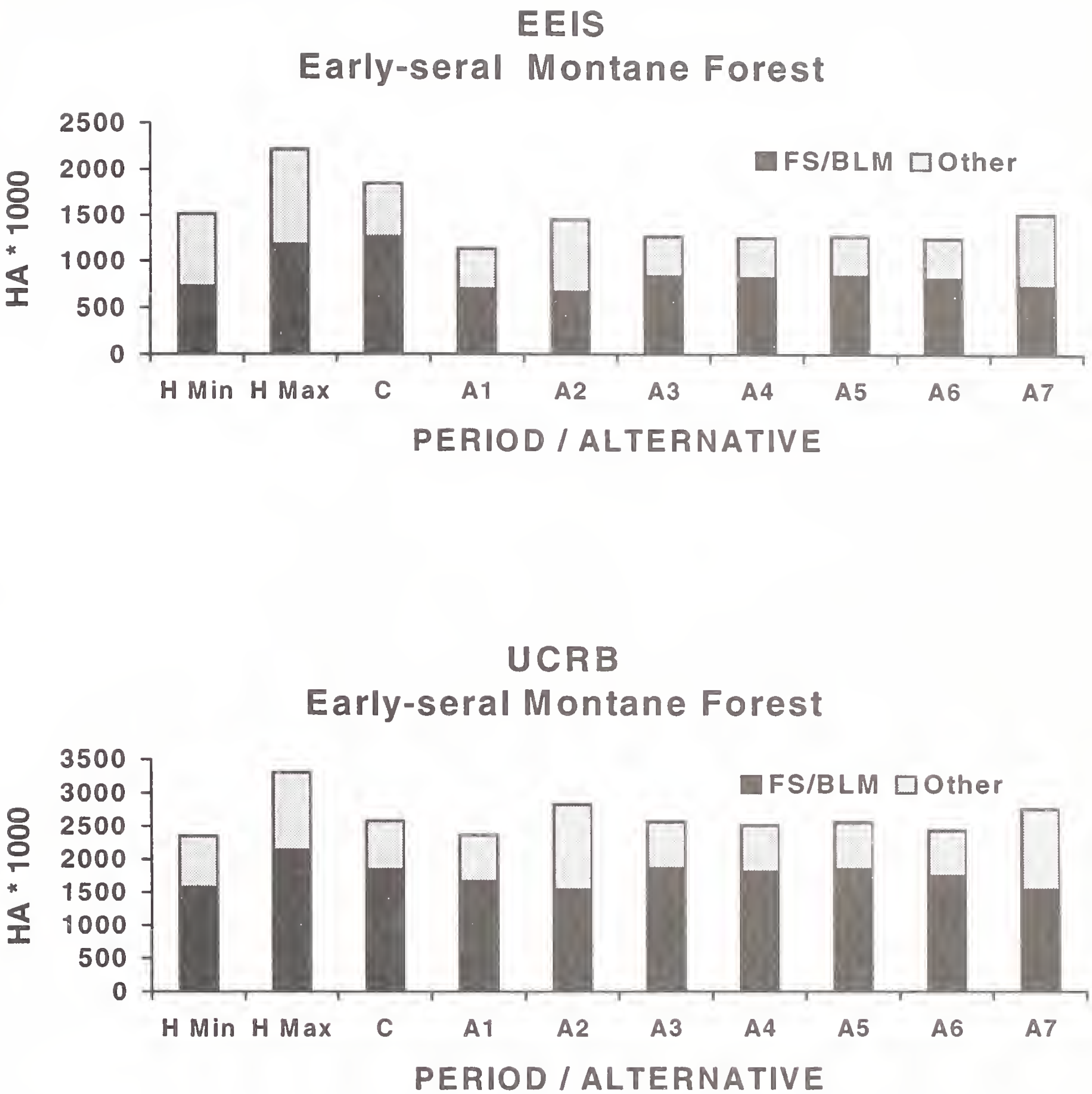
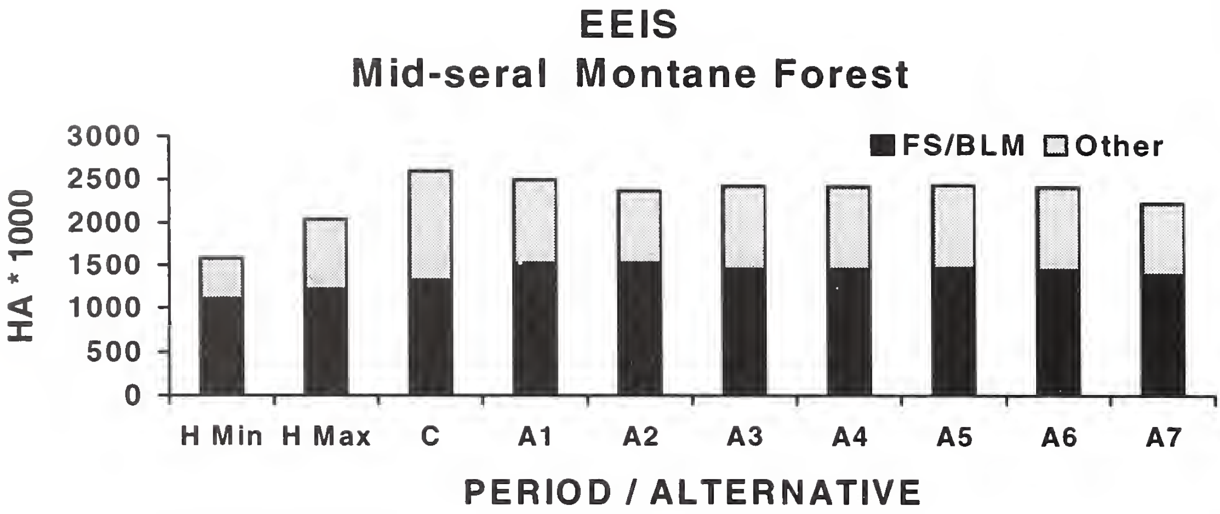


Figure 2.33 — Comparison of the historical range to current and future (100 year) projections for alternatives 1 through 7 for the early-seral montane forest community for the Eastside and Upper Columbia River Basin EIS areas.



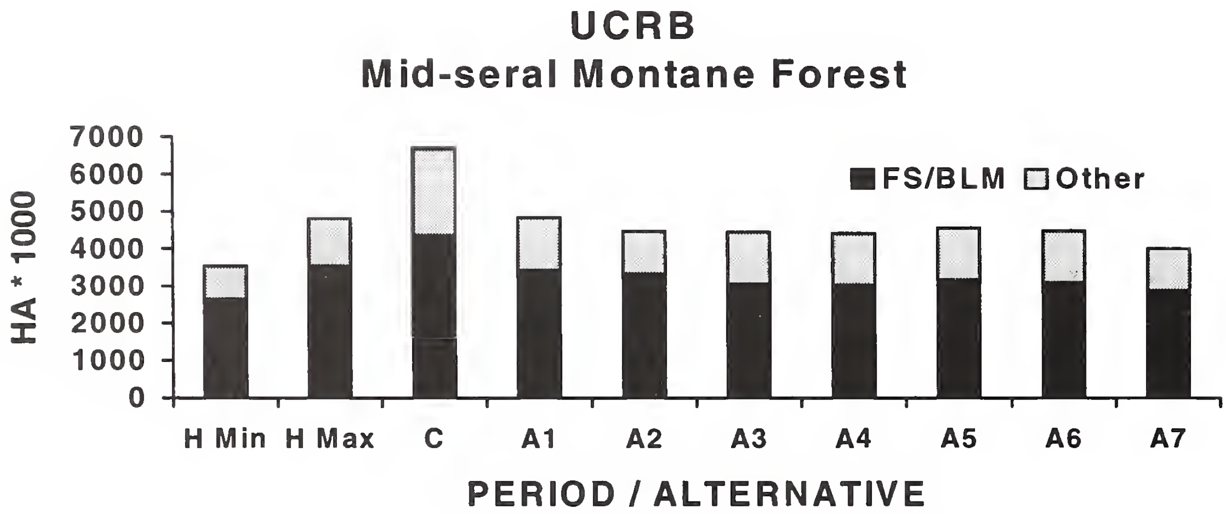
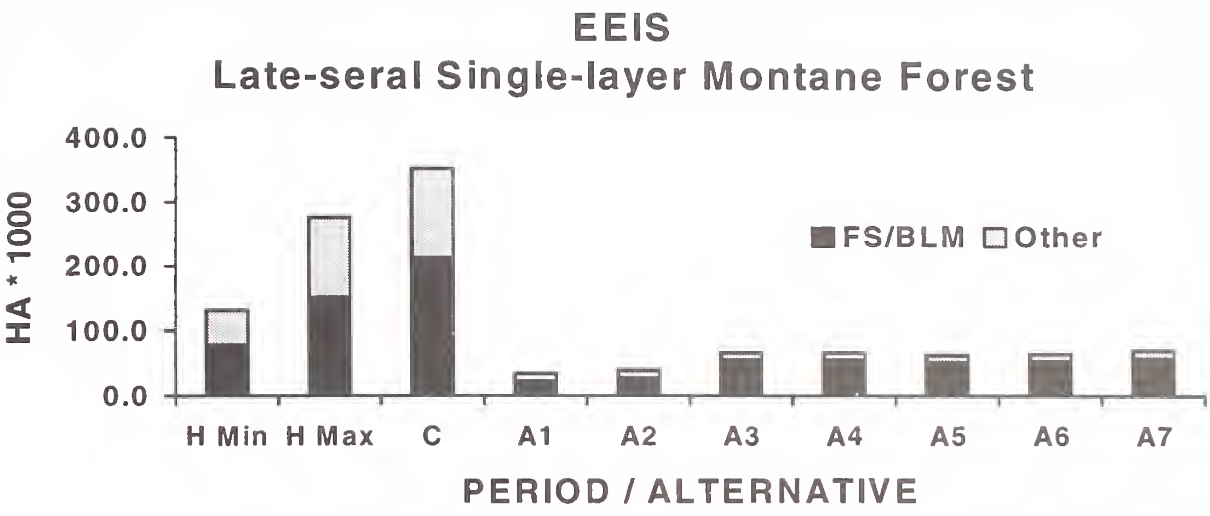


Figure 2.34 — Comparison of the historical range to current and future (100 year) projections for alternatives 1 through 7 for the mid-seral montane forest community for the Eastside and Upper Columbia River Basin EIS areas.



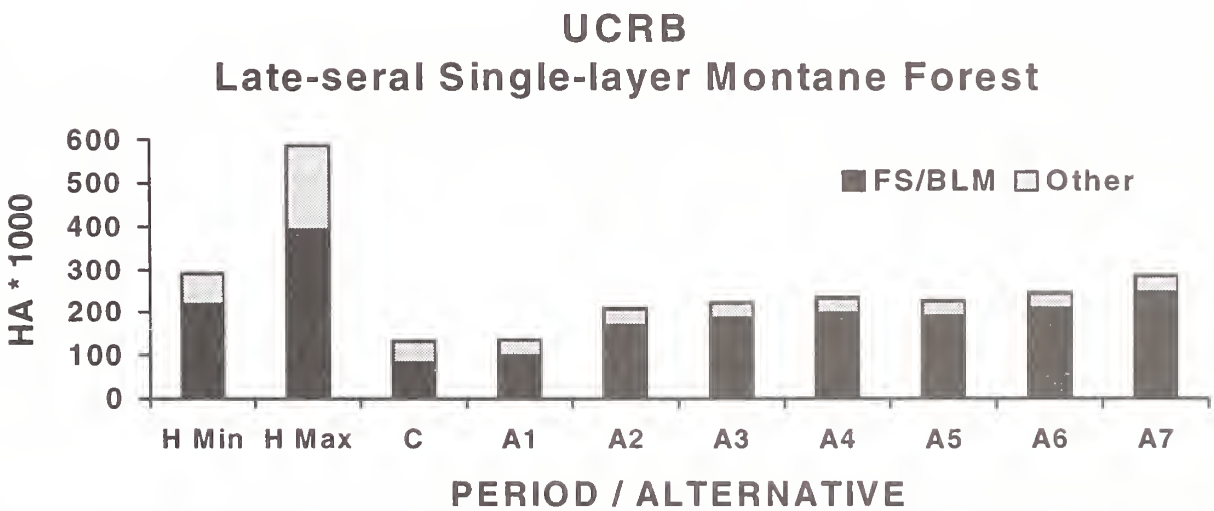


Figure 2.35 — Comparison of the historical range to current and future (100 year) projections for alternatives 1 through 7 for the late-seral single-layer montane forest community for the Eastside and Upper Columbia River Basin EIS areas.

Late-seral Montane Multi-layer Forest — For the Eastside EIS area as a whole, all alternatives except Alternative 7 projected this community's occurrence within its historical range (figure 2.36; table 2.30). However, on BLM- and FS-administered lands, Alternatives 2 through 7 projected occurrence well above the historical range (table 2.32). There were very few discernible differences in the projections of Alternatives 2 through 6.

Subalpine Forests —

Early-seral Subalpine Forest. The early-seral subalpine forest was historically relatively rare within the Eastside EIS area; its historical maximum extent did not exceed approximately 130,000 hectares. Although all alternatives would decrease this community's areal extent, only Alternatives 1, 2, and 7 would reduce its extent to levels within its historical range for both ownership strata (figure 2.37; tables 2.30 and 2.32). There were few differences among the projections for Alternatives 3 through 6, all of which would result in areas above the historical range, particularly for the BLM- and FS-administered lands.

Mid-seral Subalpine Forest. Although all alternatives would increase this community's areal extent, only Alternatives 1, 2, and 7 would result in areas within its historical range across both the entire Eastside EIS area and the BLM- and FS-administered lands within the Eastside EIS area (figure 2.38; tables 2.30 and 2.32). No substantial differences among total areas were projected for Alternatives 3 through 6.

Late-seral Subalpine Single-layer Forest. Historically, this community was relatively rare within the Eastside EIS; its historical maximum extent did not appear to exceed 55,000 hectares. All alternatives would decrease this community's areal extent to well below its historical range across the entire Eastside EIS area and also across BLM- and FS-administered lands within the Eastside EIS area (figure 2.39; tables 2.30 and 2.32). There was little substantial difference among the projections of any alternative.

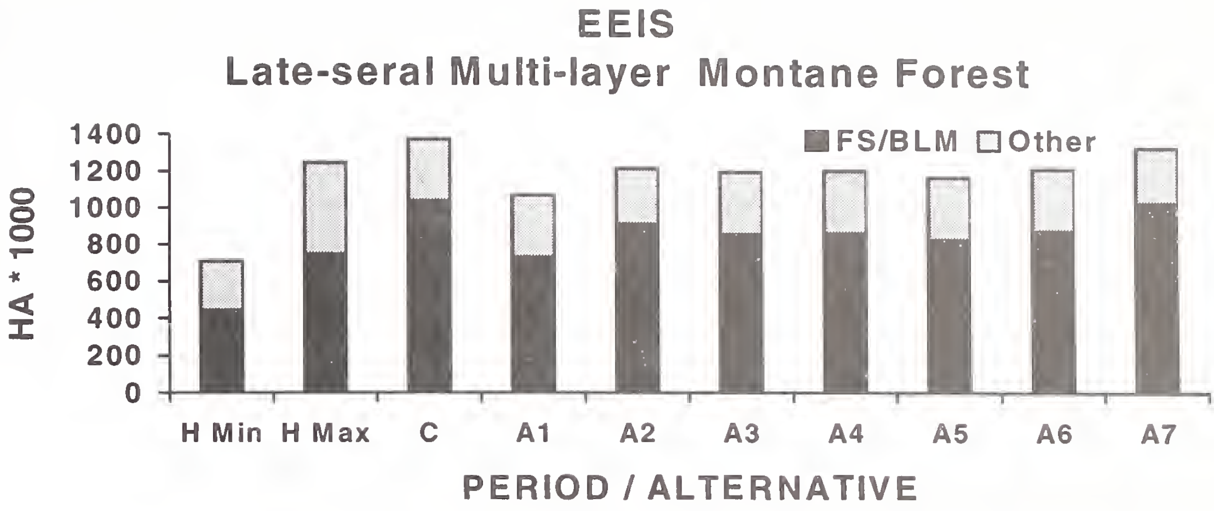
Late-seral Subalpine Multi-layer Forest. Historically, this community was also relatively rare within the Eastside EIS area; it never exceeded 250,000 hectares. All alternatives would increase this community's areal extent to a level within its historical range across the Eastside EIS area as a whole, and across BLM- and FS-administered lands within the Eastside EIS area (figure 2.40; tables 2.30 and 2.32). There was little discernible difference among the projections for Alternatives 1 through 6; Alternative 7 would result in the largest area of this community within the Eastside EIS area.

Upland Communities —

Upland Herblands. As a result of agricultural conversion on private ownerships, no alternative projections were close to the historical range of the upland herbland community across the Eastside EIS area as a whole (figure 2.41; table 2.30). However, on BLM- and FS-administered lands, all alternatives would increase this community's areal extent to a level within its historical range (table 2.32). The 100-year projections did not substantially vary among the alternatives for either ownership stratum.

Upland Shrublands. There was little variability among the simulation projections for the upland shrubland community (figure 2.42; tables 2.30 and 2.32). The 100-year projections for the Eastside EIS area as a whole were well below the historical range for this community. All projections for BLM- and FS-administered lands closely approached the historical minimum value for the upland shrubland community, except for Alternative 2, which actually fell below the historical range. However, because simulation modeling problems with the spread of exotic herblands for Alternative 2 distorted the projections, we believe the area for this community under Alternative 2 should be very similar to Alternative 1.

In summary, it appears that all alternatives would have areas of upland shrubland within their historical range on BLM- and FS-administered lands, although only marginally above their historical minimum value.



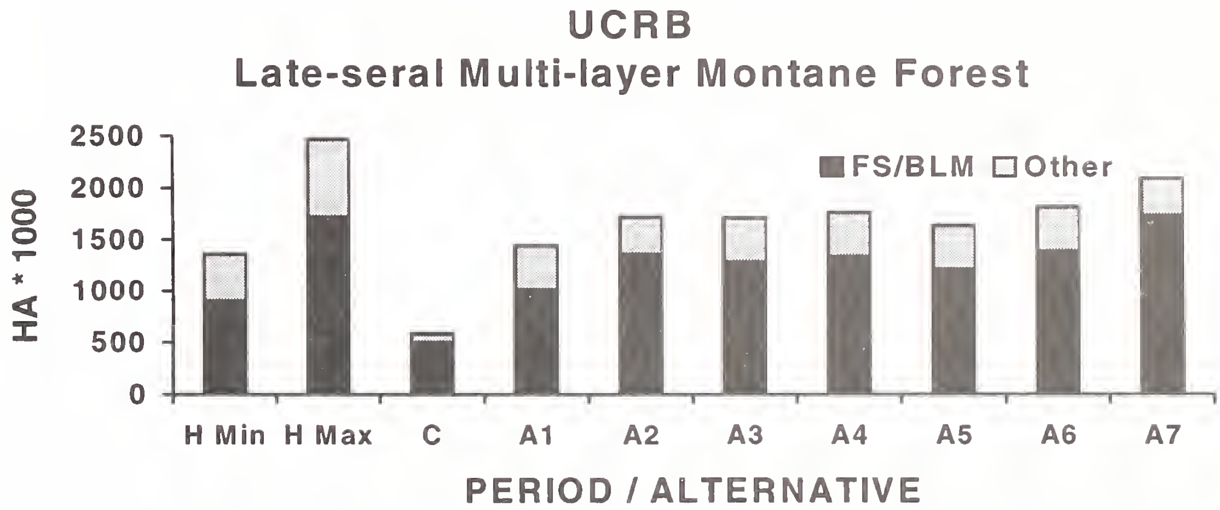
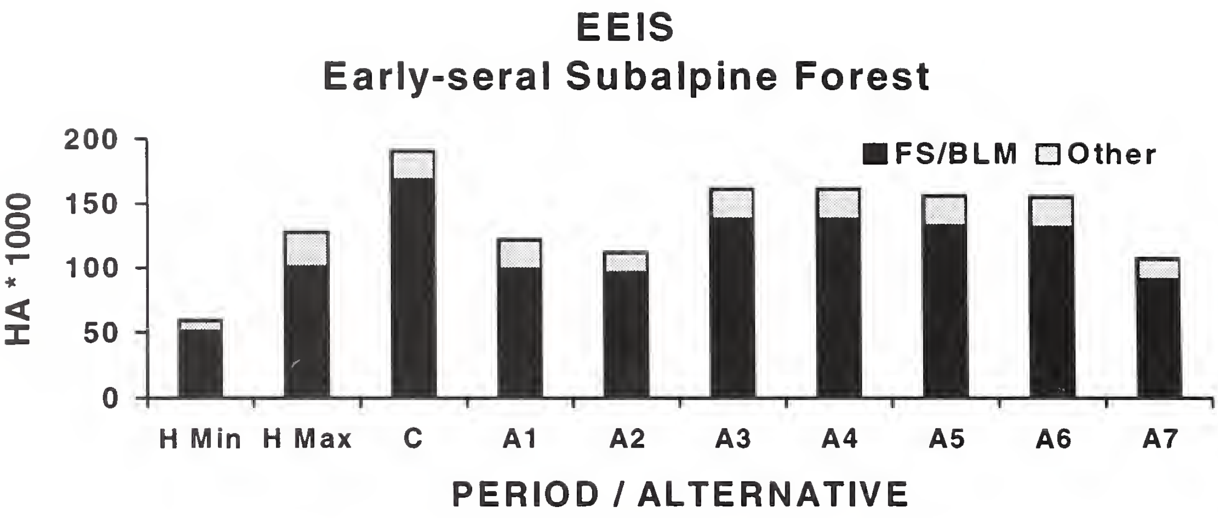


Figure 2.36 — Comparison of the historical range to current and future (100 year) projections for alternatives 1 through 7 for the late-seral multi-layer montane forest community for the Eastside and Upper Columbia River Basin EIS areas.



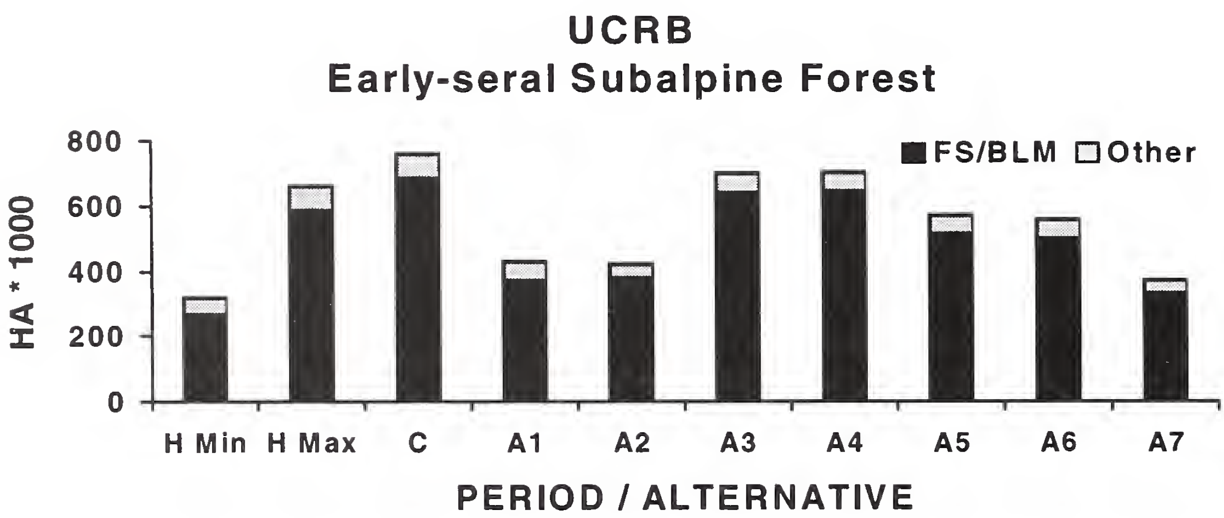
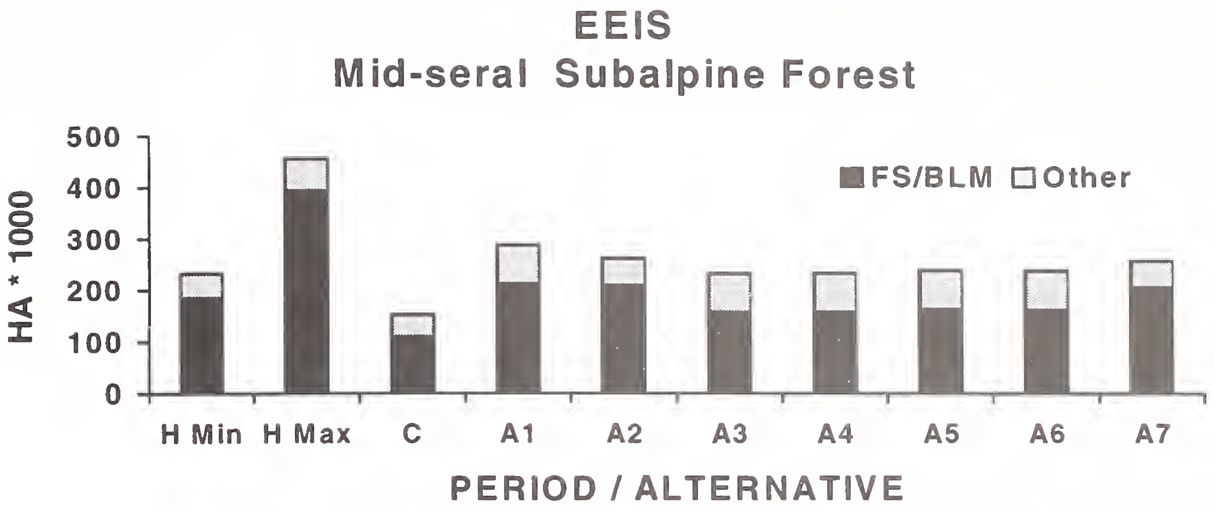


Figure 2.37 — Comparison of the historical range to current and future (100 year) projections for alternatives 1 through 7 for the early-seral subalpine forest community for the Eastside and Upper Columbia River Basin EIS areas.



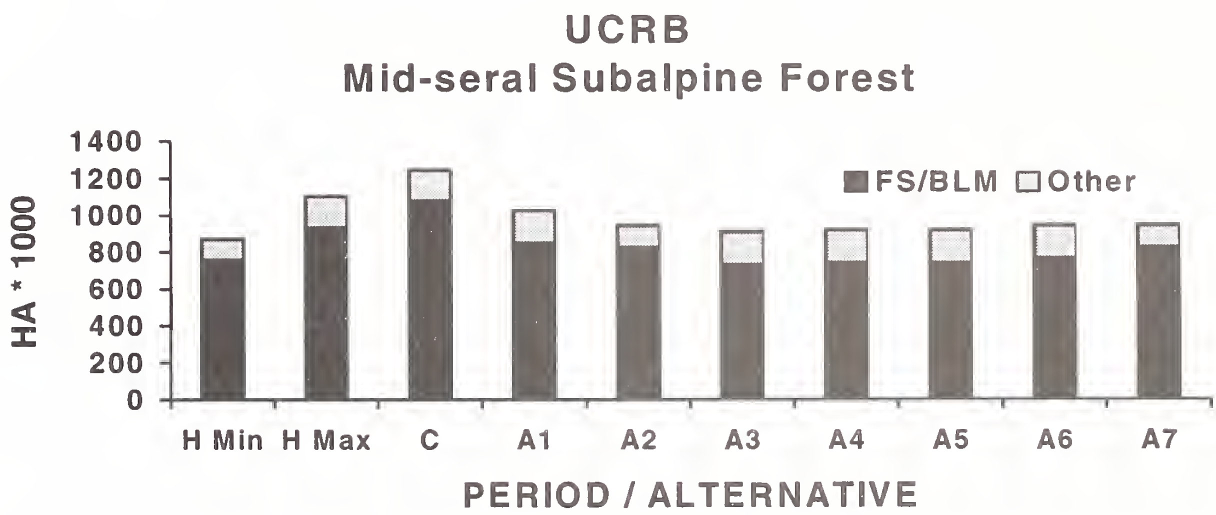
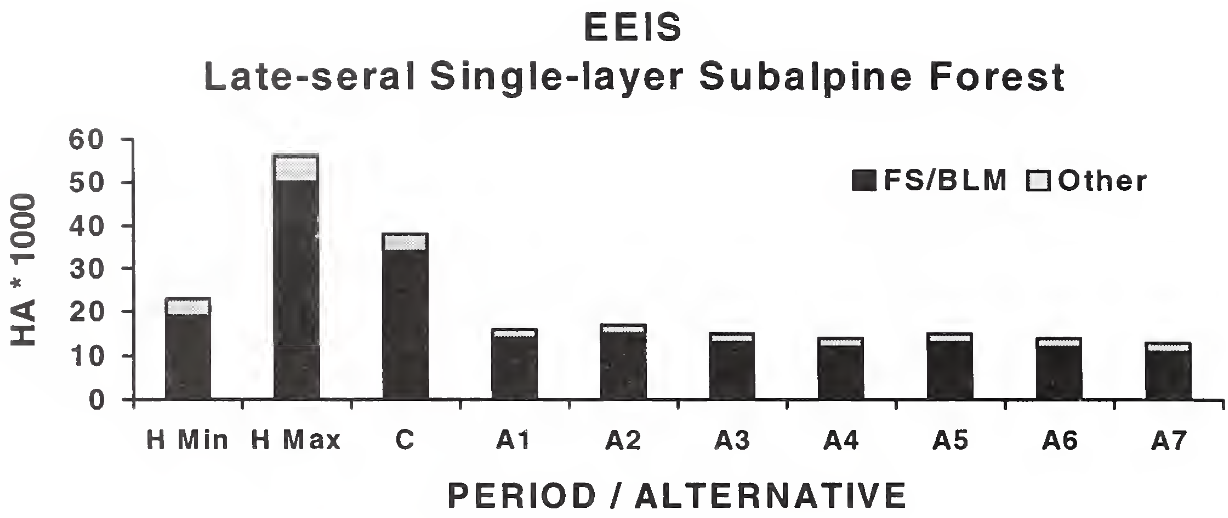


Figure 2.38 — Comparison of the historical range to current and future (100 year) projections for alternatives 1 through 7 for the mid-seral subalpine forest community for the Eastside and Upper Columbia River Basin EIS areas.



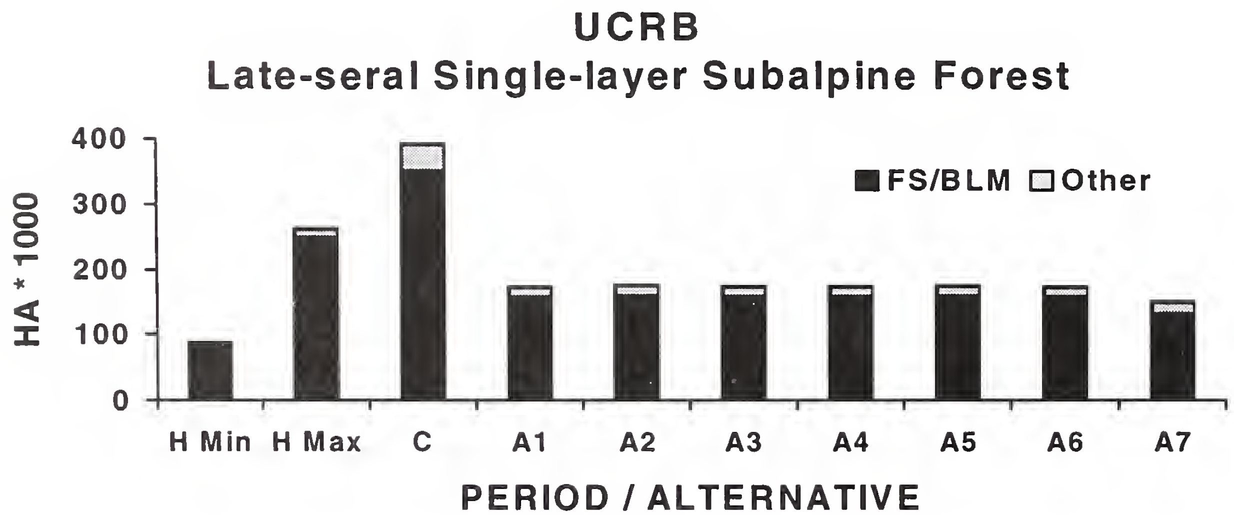
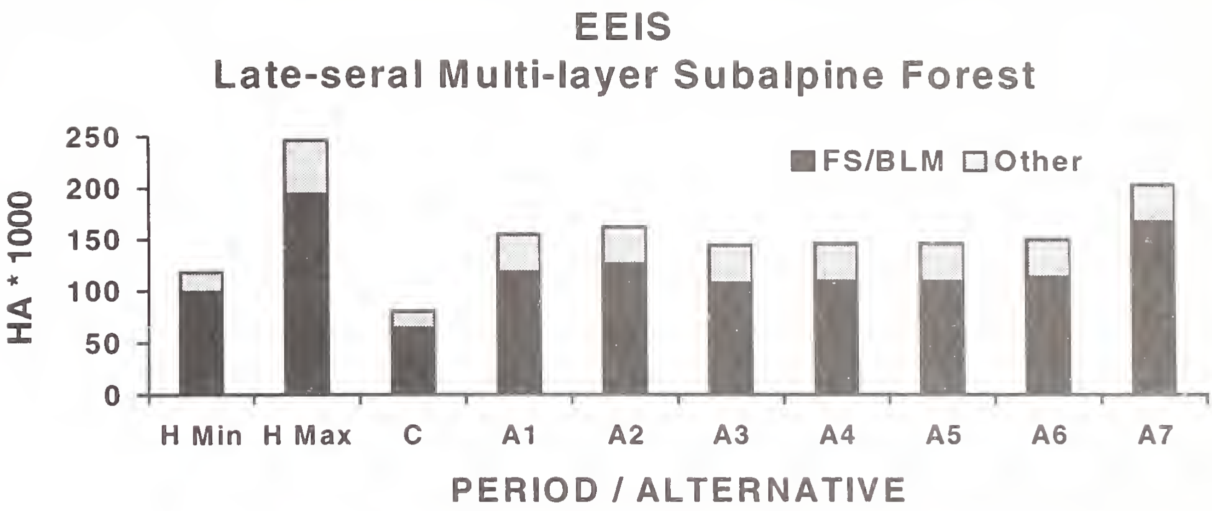


Figure 2.39 — Comparison of the historical range to current and future (100 year) projections for alternatives 1 through 7 for the late-seral single-layer subalpine forest community for the Eastside and Upper Columbia River Basin EIS areas.



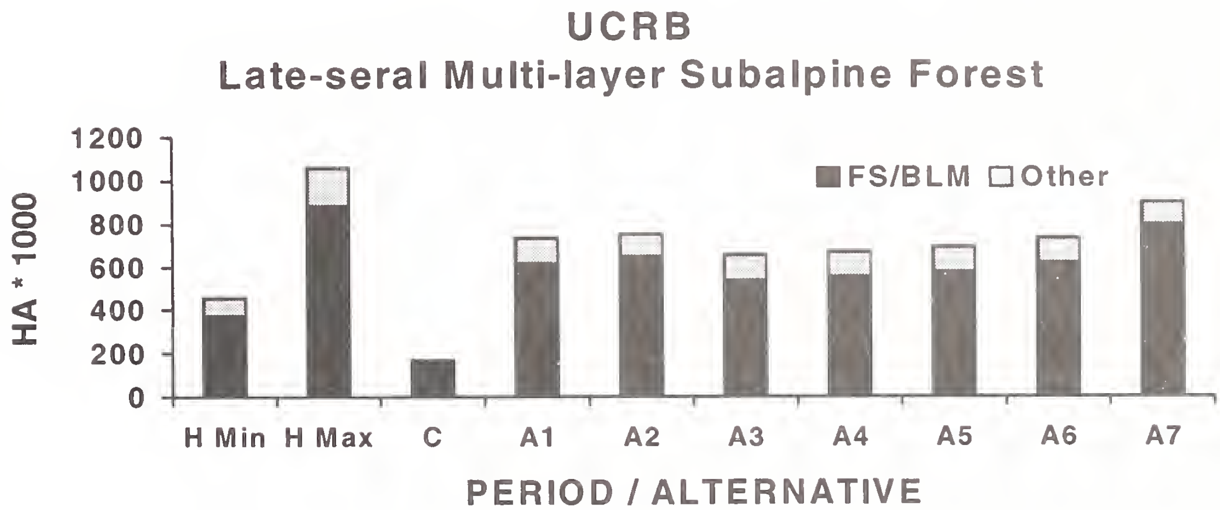
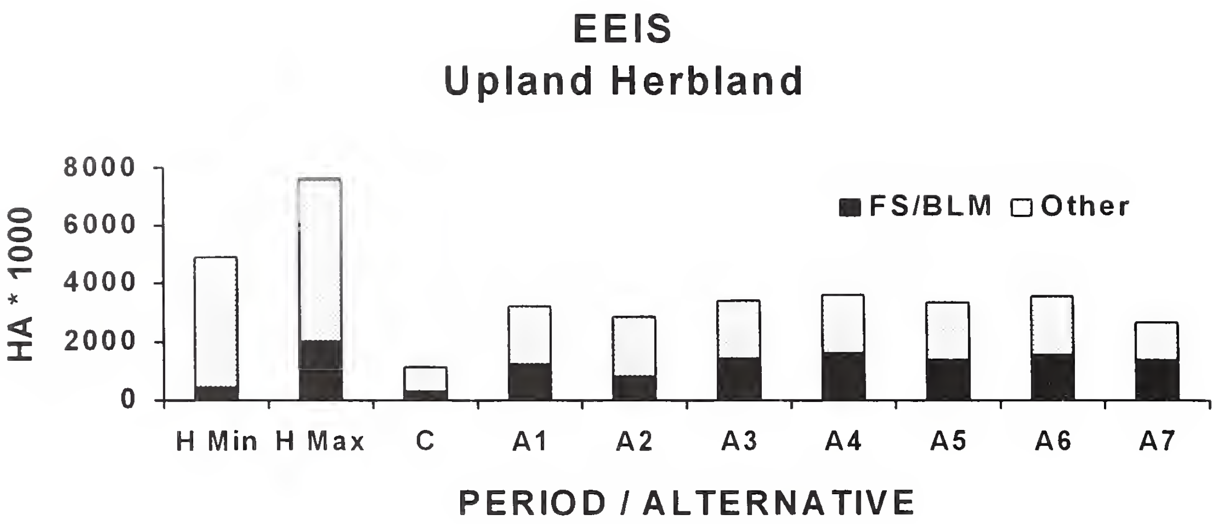


Figure 2.40 — Comparison of the historical range to current and future (100 year) projections for alternatives 1 through 7 for the late-seral multi-layer subalpine forest community for the Eastside and Upper Columbia River Basin EIS areas.



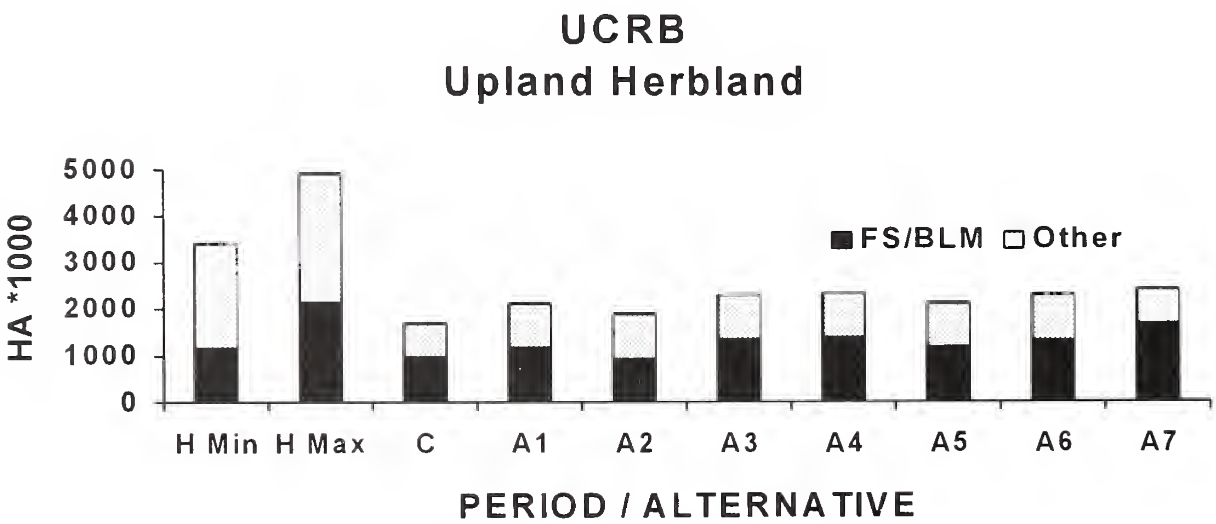
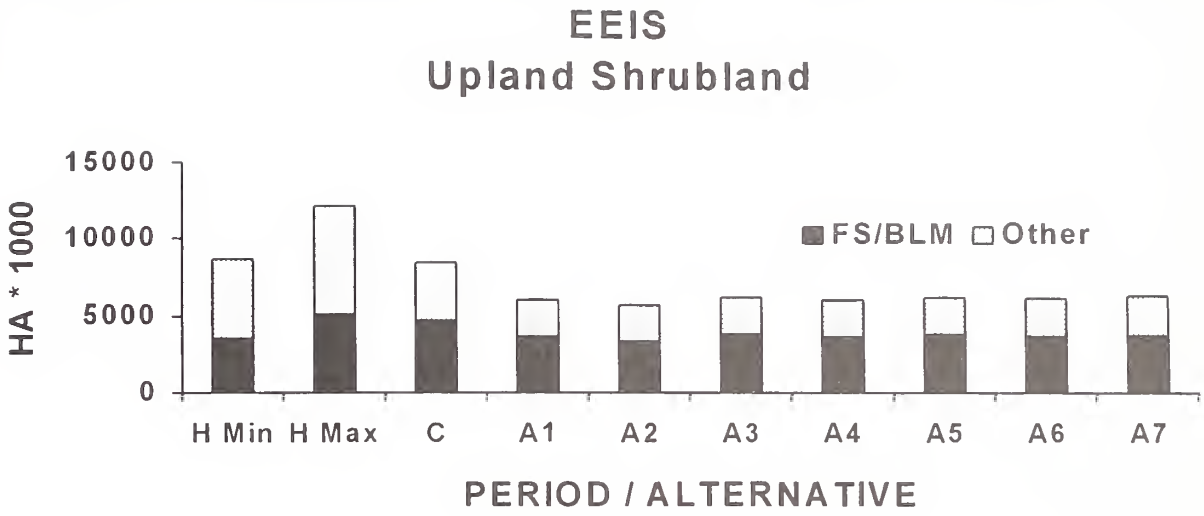


Figure 2.41 — Comparison of the historical range to current and future (100 year) projections for alternatives 1 through 7 for the upland herbland community for the Eastside and Upper Columbia River Basin EIS areas.



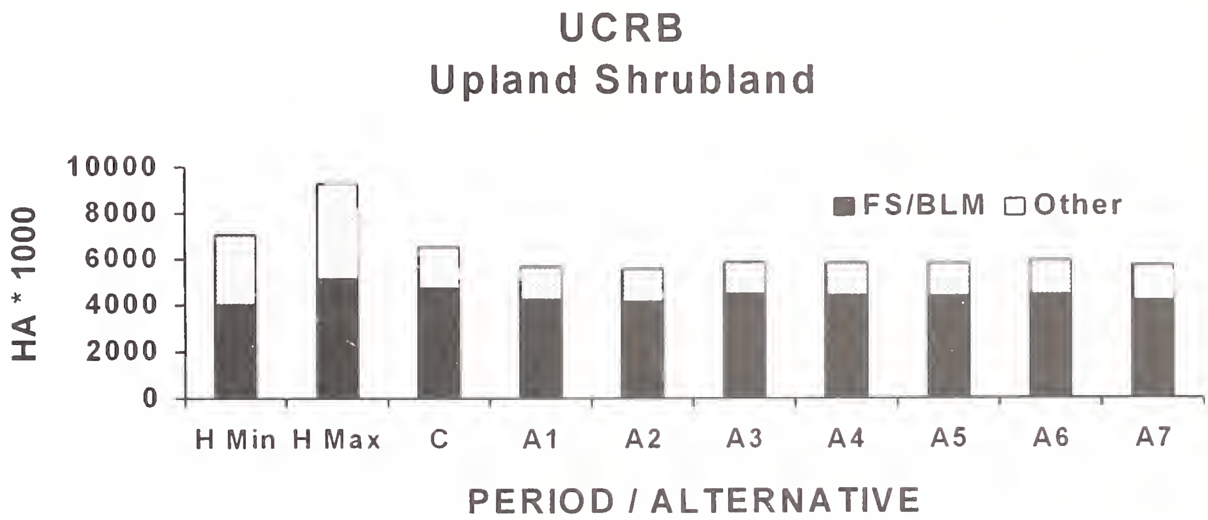


Figure 2.42 — Comparison of the historical range to current and future (100 year) projections for alternatives 1 through 7 for the upland shrubland community for the Eastside and Upper Columbia River Basin EIS areas.

Upland Woodlands. All alternatives would decrease this community's areal extent, for both ownership strata (figure 2.43; tables 2.30 and 2.32). However, for the Eastside EIS area as a whole, all alternatives would result in areas of upland woodlands that exceed the historical range. On BLM- and FS-administered lands within the Eastside EIS area, Alternatives 3 through 6 would have areas within the historical range of the upland woodland community.

<u>Riparian Communities</u> —

Riparian Herblands, Shrublands, and Woodlands. As stated previously, we could not accurately estimate the historical range of riparian communities, nor do we feel confident with our estimates for the current period and 100-year projections. This low level of accuracy and confidence is due to the coarse scale of our simulations, which overemphasized the very large patches and did not accurately portray outcomes. However, the future trends for All and Other lands should generally be correct. We believe our projections represent a more negative outcome for BLM- and FS-lands in Alternatives 2, 3, 4, 5, 6 and 7 than suggested by the objectives and standards (figs. 2.44, 2.45 and 2.46).

Overall, at our scale of analysis, there was little variability among the alternative projections except for Alternative 7. The substantial differences in the areal extents of the riparian herblands and riparian shrublands for Alternative 7 are attributed to the amount of wildfire likely to occur within the reserve areas.

<u>Exotic Herbland Communities</u> —

Exotic Herbland. We are uncertain about our estimates of the exotic herbland community's areal extent for both the current period and 100-year projections. However, on a relative basis among alternatives, the future trend is generally correct (figure 2.47). Because the rate of increase used for the exotic herbland community was very conservative, the exotic herbland community is likely to increase at a faster rate than projected. Because our 100-year projection for Alternative 2 was distorted due to modeling difficulties, the projection was adjusted to be similar to Alternative 1. The projected extent for exotic herblands under Alternative 7 may be high relative to the other action alternatives (3 through 6), particularly for all ownerships in the EEIS. While exotic herblands will generally increase on BLM- and FS-administered lands in reserves, exotic herblands on lands outside reserves will probably not increase more rapidly than under Alternative 3.

Additional detail about the alternative outcomes relating to exotic herblands is included in this chapter in the discussion about the effects of alternatives on selected noxious weeds and cheatgrass.

Upper Columbia River Basin

<u>Montane Forests</u> —

Early-Seral Lower Montane Forest. No projection of any alternative showed an increase in this community's areal extent to a level within its historical range across all ownerships within the Upper Columbia River Basin (figure 2.29; table 2.34). However, we expect that Alternatives 1, and 3 through 6, would substantially increase this community's area to within its historical range on BLM- and FS-administered lands in this basin (table 2.36).

Mid-seral Lower Montane Forest. No alternative would reduce this community's areal extent to within its historical range for either ownership stratum (figure 2.30; tables 2.34 and 2.36). While all restoration alternatives have comparable projections, Alternatives 1 and 2 have areal projections above the historical range for both ownership strata within the Upper Columbia River Basin. Alternatives 3 through 7 would not measurably change the area of the mid-seral lower montane community type.

Late-seral Lower Montane Single-layer Forest. The 100-year projections of all alternatives would substantially increase this community's areal extent (figure 2.31; tables 2.34 and 2.36).

However, for the Upper Columbia River Basin area as a whole, no alternative has projections within its historical range. Alternatives 3 through 6 would increase the areal extent of this community (with no measurable difference among alternatives) to within its historical range on BLM- and FS-administered lands within the Upper Columbia River Basin.

Late-seral Lower Montane Multi-layer Forest. The 100-year projections of this community's areal extent across all ownerships within the Upper Columbia River Basin were well above the historical range for all alternatives (figure 2.32; table 2.34). On BLM- and FS-administered lands, Alternatives 3 through 6 would reduce the area of this community to a level nearly within its historical range (table 2.36). Alternatives 1 and 2 would substantially exceed the historical range of this community for BLM- and FS-administered lands.

Early-seral Montane Forest. The 100-year projections for this community's areal extent were very similar (figure 2.33; tables 2.34 and 2.36). All alternatives, except for Alternative 1, were projected to be within this community's historical range across all ownerships within the Upper Columbia River Basin. On BLM- and FS-administered lands, the 100-year projections for Alternatives 1, and 3 through 6, were within the community's historical range, whereas the outcomes for Alternatives 2 and 7 were below its historical range.

Mid-seral Montane Forest. Of the forested environments, the mid-seral montane forest community composes the largest proportion of the Upper Columbia River Basin. All alternatives, except for Alternative 1, would reduce this community's areal extent to within its historical range across both ownership strata within the Upper Columbia River Basin (figure 2.34; tables 2.34 and 2.36). The projection for Alternative 1 was still slightly above the historical range across all ownerships. There was very little difference among the 100-year projections for any of the alternatives.

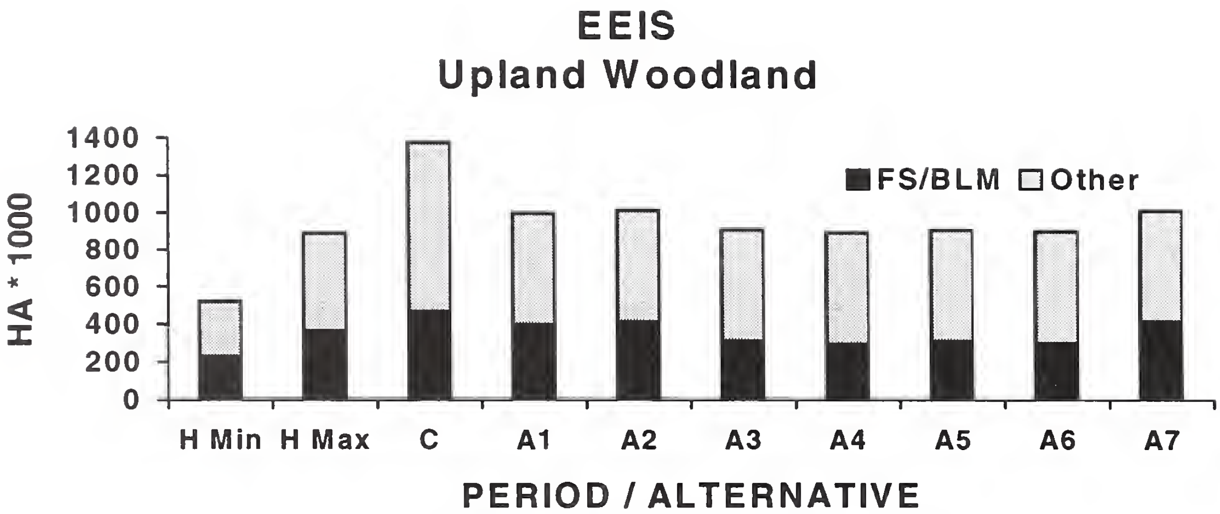
Late-seral Montane Single-layer Forest. With the exception of Alternative 1, all alternatives would measurably increase this community's areal extent. Overall, however, the projections of all alternatives were still well below its historical range (figure 2.35; tables 2.34 and 2.36). There was no substantial difference among the projections for Alternatives 2 through 6, which would exceed that for Alternative 1, but be somewhat less than Alternative 7. Most of the increased area of this community would be accrued across BLM- and FS-administered lands.

Late-seral Montane Multi-layer Forest. For the Upper Columbia River area as a whole, all alternatives except for Alternative 7 projected this community's occurrence within its historical range across both ownership strata (figure 2.36; tables 2.34 and 2.36). On BLM- and FS-administered lands, the 100-year projection of Alternative 7 was slightly more than this community's historical range. There was very little discernible difference in the projections of Alternatives 2 through 6, which would have greater increases than Alternative 1 but less increase than Alternative 7.

Subalpine Forests —

Early-seral Subalpine Forest. This community type was historically relatively rare within the Upper Columbia River Basin; its historical maximum extent did not exceed approximately 650,000 hectares. About 90 percent of the early-seral subalpine forest community occurs within BLM- and FS-administered lands within the Upper Columbia River Basin. All alternatives would decrease this community's areal extent, but Alternatives 3 and 4 are closer to the historical range in both ownership strata (figure 2.37; tables 2.34 and 2.36).

Mid-seral Subalpine Forest. All alternatives would decrease this community's areal extent to within its historical range across the entire Upper Columbia River Basin, and across BLM- and FS-administered lands within the Basin (figure 2.38; tables 2.34 and 2.36). There was little substantial difference in total area projected among any of the alternatives.



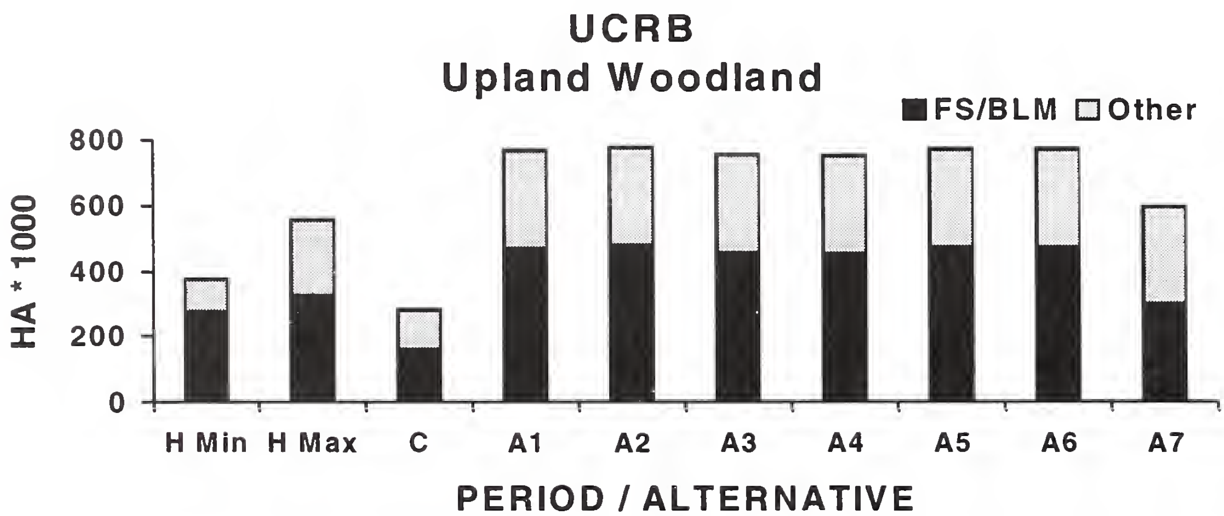


Figure 2.43 — Comparison of the historical range to current and future (100 year) projections for alternatives 1 through 7 for the upland woodland community for the Eastside and Upper Columbia River Basin EIS areas.

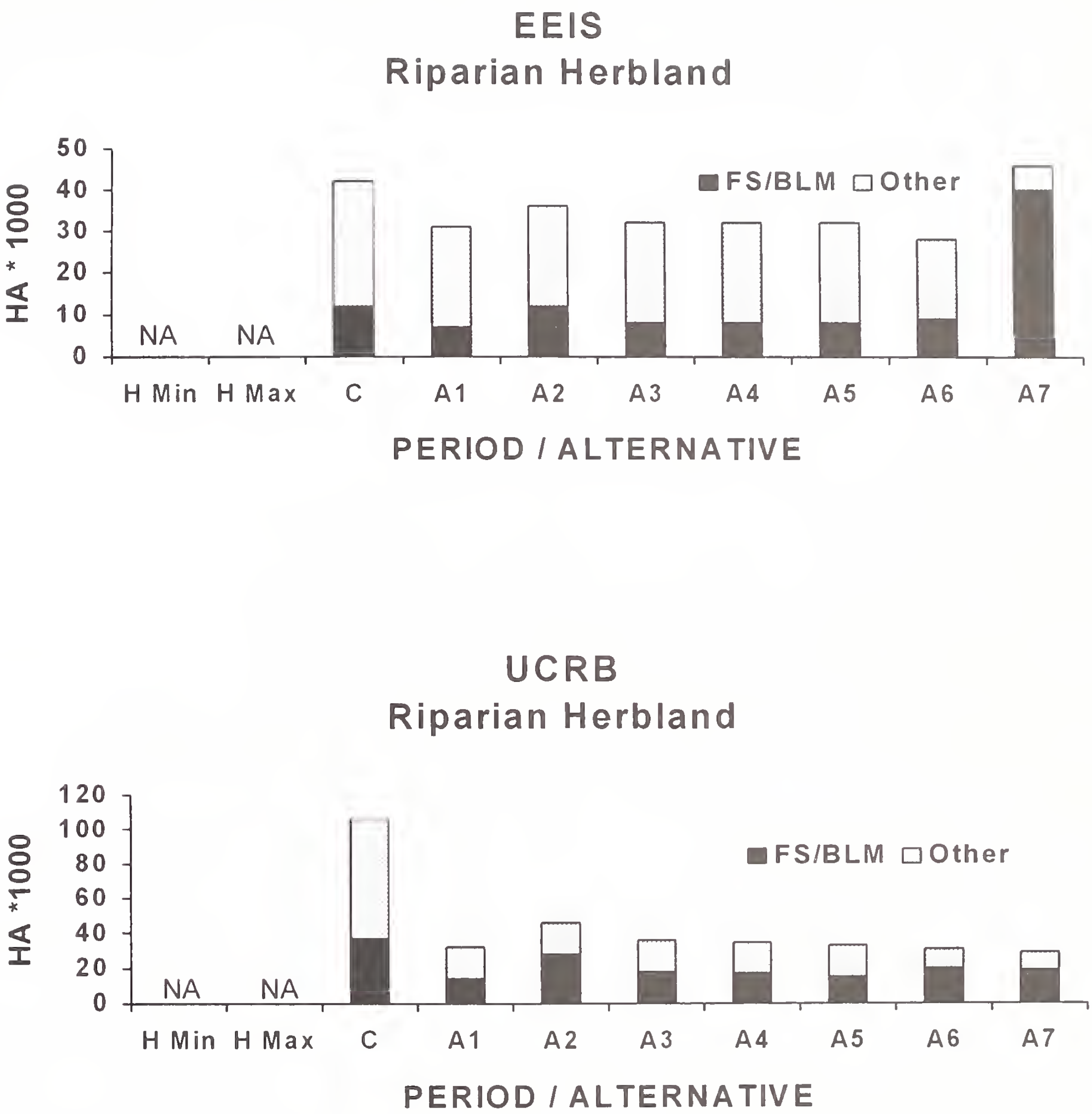
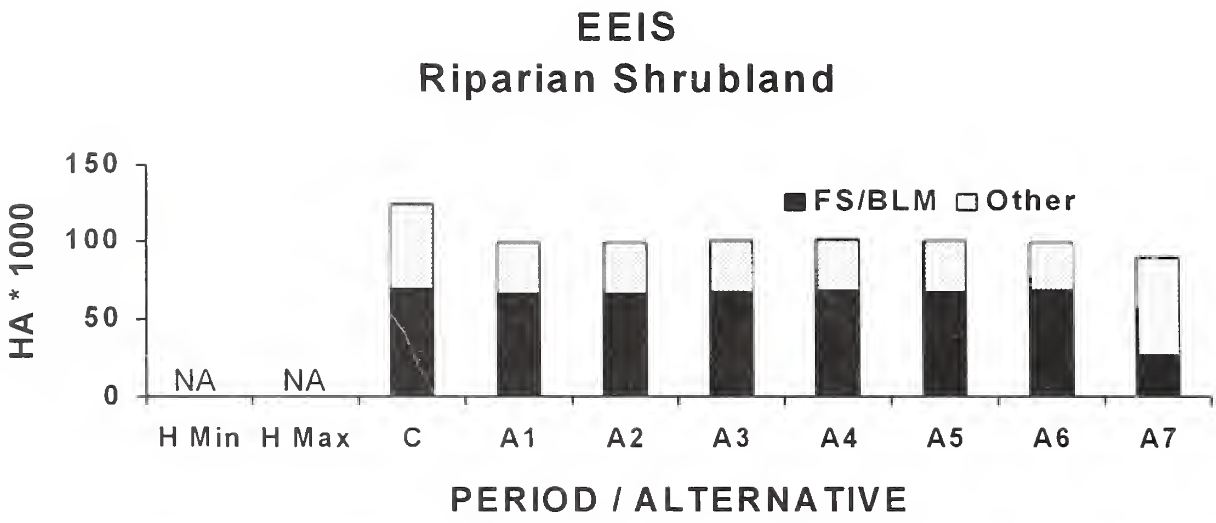


Figure 2.44 — Comparison of the historical range to current and future (100 year) projections for alternatives 1 through 7 for the riparian herbland community for the Eastside and Upper Columbia River Basin EIS areas.



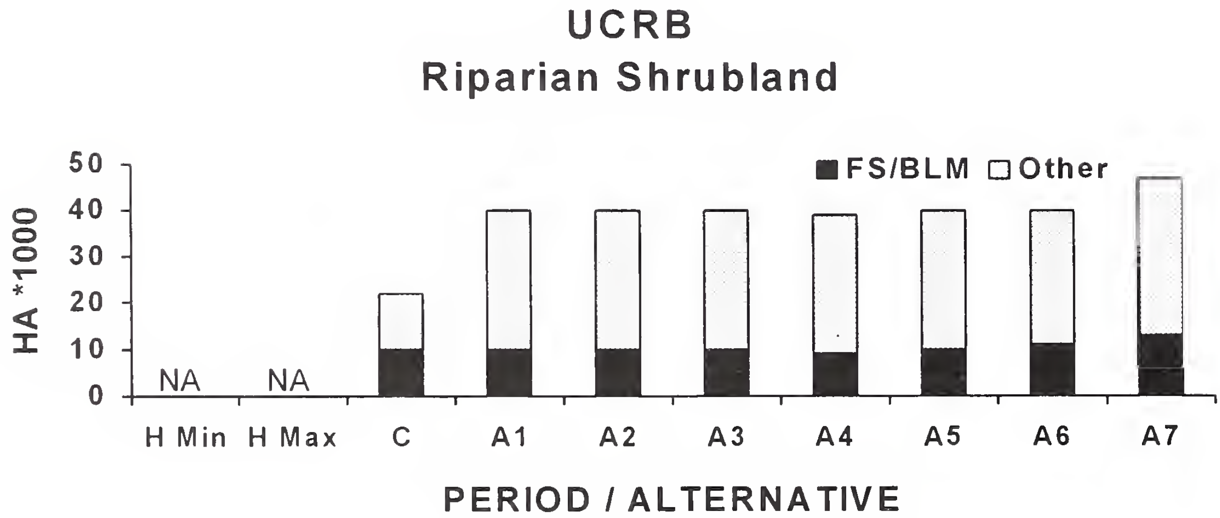
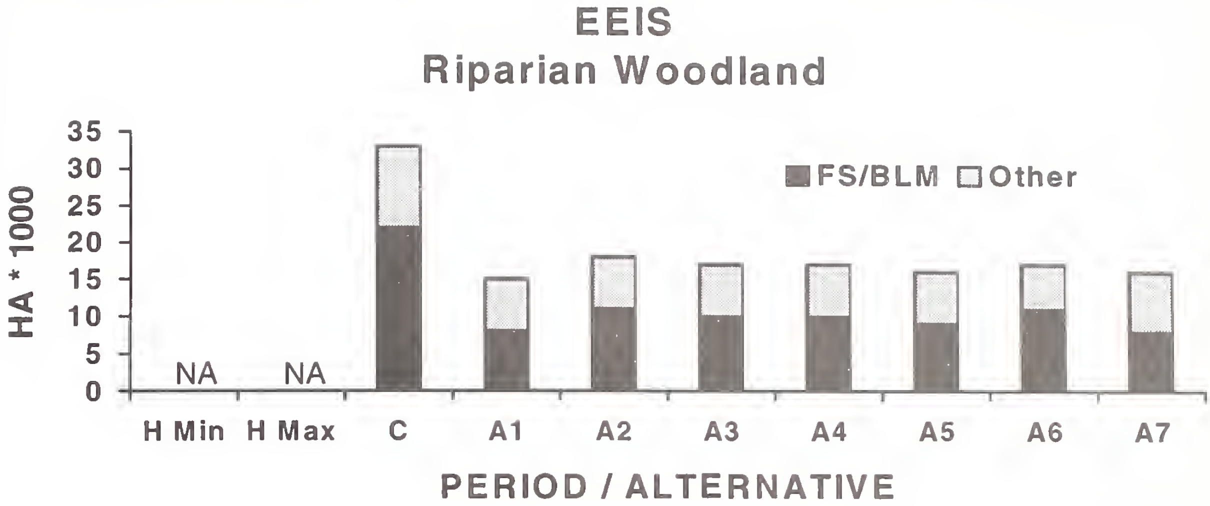


Figure 2.45 — Comparison of the historical range to current and future (100 year) projections for alternatives 1 through 7 for the riparian shrubland community for the Eastside and Upper Columbia River Basin EIS areas.



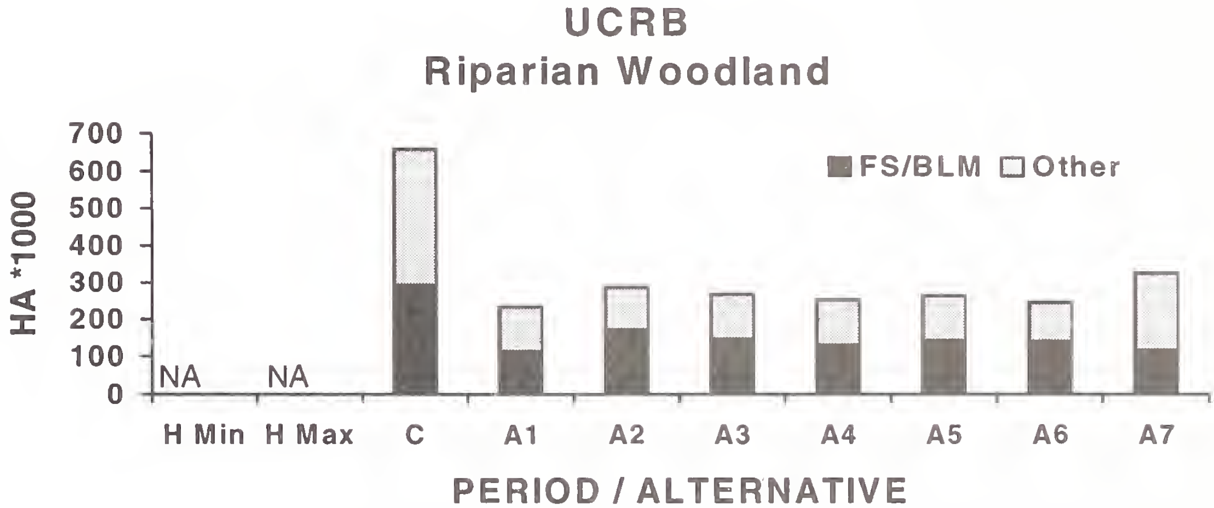
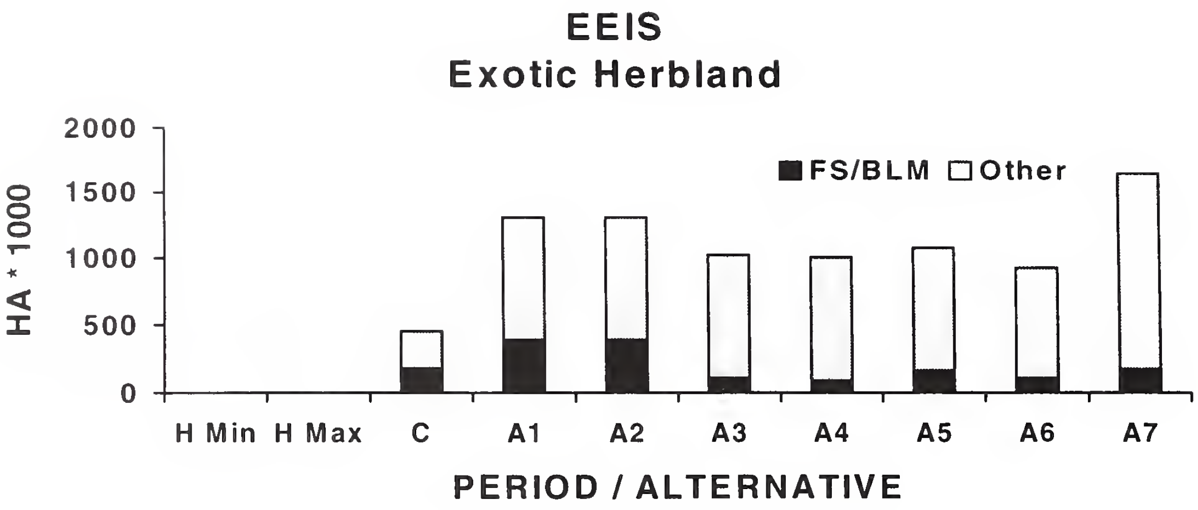


Figure 2.46 — Comparison of the historical range to current and future (100 year) projections for alternatives 1 through 7 for the riparian woodland community for the Eastside and Upper Columbia River Basin EIS areas.



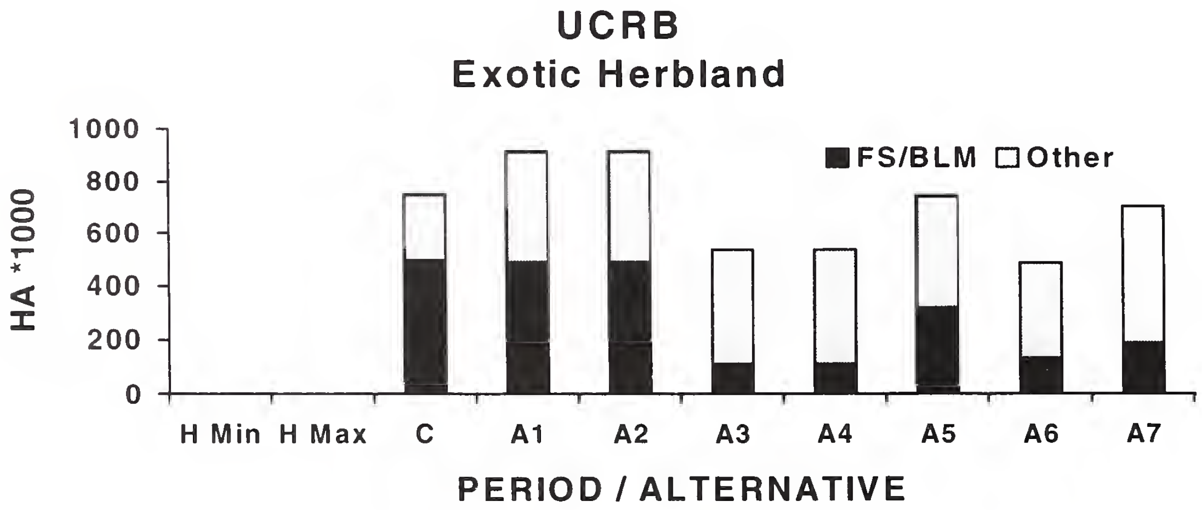


Figure 2.47 — Comparison of the historical range to current and future (100 year) projections for Alternatives 1 through 7 for the exotic herbland community for the Eastside and Upper Columbia River Basin EIS areas. Amount in Alternative 2 adjusted due to errors in modeling.

Late-seral Subalpine Single-layer Forest. Historically, this community was relatively rare within the Upper Columbia River Basin; its historical maximum extent did not appear to exceed 250,000 hectares. Virtually all of this community is found on BLM- and FS-administered lands within the Upper Columbia River Basin. All alternatives would substantially decrease this community's areal extent to within its historical range across the entire Upper Columbia River Basin, and across BLM- and FS-administered lands within the Basin (figure 2.39; tables 2.34 and 2.36). There was little substantial difference among the projections of any alternative.

Late-seral Subalpine Multi-layer Forest. All alternatives would substantially increase this community's areal extent to a level within it historical range across the Upper Columbia River Basin as a whole, and across BLM- and FS-administered lands within the Basin (figure 2.40; tables 2.34 and 2.36). There was little discernible difference among the projections for Alternatives 1 through 6; Alternative 7 would result in the largest area of this community within the Upper Columbia River Basin.

Upland Communities —

Upland Herbland. Primarily as a result of agricultural conversion on private ownerships, no alternative projections were similar to the historical range of the upland herbland community across the Upper Columbia River Basin as a whole (figure 2.41; tables 2.34 and 2.36). However, on BLM- and FS-administered lands, all alternatives except Alternative 2 would increase this community's areal extent to a level within its historical range. The 100-year projections did not vary substantially among the alternatives for either ownership stratum.

Upland Shrubland. Historically, the upland shrubland community comprised the largest proportion of the Upper Columbia River Basin, but currently its areal extent is somewhat less than the mid-seral montane forest. There was little variability among the simulation projections for the upland shrubland community (figure 2.42; tables 2.34 and 2.36). While the 100-year projections for the Upper Columbia River Basin as a whole fell well below the historical range for this community, all projections for BLM- and FS-administered lands were within the historical range.

Upland Woodland. The upland woodland community within the Upper Columbia River Basin is comprised almost entirely of the mixed-conifer woodland cover type. Historically, however, the upland woodland community composed a relatively small proportion of this basin. All alternatives would substantially increase the areal extent of upland woodlands to a level well above its historical range for the Upper Columbia River Basin as a whole and for BLM- and FS-administered lands (figure 2.43; tables 2.34 and 2.36). There was little variability among the projections of Alternative 1 through 6, which were somewhat greater than Alternative 7.

Riparian Communities —

Riparian Herbland, Shrubland, and Woodland. As stated previously, we could not accurately estimate the historical range of riparian communities, nor do we feel confident with our estimates for the current period and 100-year projections. The reason for this uncertainty is that our simulations were conducted at too coarse a scale, which overemphasized the very large patches and did not accurately portray outcomes.

The future trends, however, should generally be correct for All and Other lands. Alternatives 2 through 7 represent a more negative outcome than suggested by their objectives and the standards. Overall because of similar standards, there was little variability among the Alternatives 2 through 7 projections.

Exotic Herbland Communities —

Exotic Herbland. We are uncertain about our estimates of the areal extent of the exotic herbland community for both the current period and 100-year projections. However, on a relative basis

among alternatives the future trend should generally be correct. Some of our uncertainty about exotic herbland is related to the very conservative estimate we used for the exotic herbland's rate of increase, which means the exotic herbland community may likely increase at a faster rate than projected. Also, our 100-year projection for Alternative 2 is adjusted due to modeling difficulties to be similar to Alternative 1. The projected extent for exotic herblands under Alternative 7 may be too great relative to the other action alternatives (3 through 6), particularly for all ownerships in the UCRB EIS area. While exotic herblands will generally increase on BLM- and FS-administered lands in reserves, exotic herblands on land outside reserves will probably not increase more rapidly than under Alternative 3.

Additional detail relating to exotic herbland and the alternative outcomes is included in this chapter's discussion about the effects of alternatives on selected noxious weeds and cheatgrass.

Summary

We would recommend that any future analysis of broad-scale communities as terrestrial habitats use the physiognomic type groups stratified by potential vegetation group (PVG) or, for a coarser grouping, by forest and rangeland. The changing nature of lower montane, montane, subalpine and non-forest terrestrial communities in relation to existing vegetation cover types with no tie to the biophysical environment is a substantial hindrance to this analysis. Without the tie to the biophysical environment little inference can be made relative to temperature, moisture, soils, terrain, or consistency of the terrestrial communities with the biophysical system and inherent succession and disturbance processes.

Terrestrial Community Departures

The lack of available information about the broad-scale habitat relationships and the population responses to habitat change for most plant and animal species occurring in the Interior Columbia River Basin creates difficulties for scientists and managers in predicting the effects of future habitat outcomes on the persistence of resident taxa (Hann and others, in press; Jones and Hann 1996). However, estimating broad-scale habitat departures from historical ranges of conditions provides an index of broad-scale vegetation changes in the context of natural systems. Further, determining how habitat changes with the dynamics of natural systems provides a means of conducting coarse-filter inferences of risks to species persistence (Hunter 1991).

A primary assumption of this coarse-filter approach to habitat assessment is that conservation of the areal extent of a community or habitat within its historical conditions should also allow species adapted to those ranges to persist into the future. In addition, we recognize that the fitness of many, if not most, species is also strongly correlated with the future condition of fine-scale habitat attributes. However, it is not feasible to compute a fine-scale habitat assessment of a future landscape having the extent and complexity of the Basin.

In our evaluation, we compared the current and projected future (alternative year 100) broad-scale habitat availabilities within a subbasin (see map 2.23) to a range of estimated historical conditions. *We assumed that a species' persistence within a subbasin was not at risk if the projected area of their primary habitat, as described in the Species-Environment Relations database (Marcot and others, in press), fell within the 75th percent mid-range of the historical data. We assumed that risk to persistence increased substantially when habitat availability fell below the 75th percent mid-range of the historical data. Furthermore, the likelihood of extirpation within a subbasin increased when habitat availability fell below the 100th percent range of the historical data. Conversely, persistence likelihood within a subbasin increased as habitat availability exceeded the 75th percent mid-range of the historical data.*

Methods of Evaluating Terrestrial Community Departures

Terrestrial community type departures were developed to estimate the magnitude of broad-scale habitat changes in forests and rangelands within subbasins. We used 1-km^2 (one square kilometer) resolution continuous broad-scale data, summarized by subbasin, to assess habitat departures of forest and rangeland ecosystems.

We aggregated 42 cover types and 25 structural stages into 24 terrestrial community types by further collapsing the communities having late-seral single-layer and late-seral multi-layer structures into a "late" class. Next, we estimated the departure from historical condition ranges by subbasin for 12 terrestrial communities, including nine forest terrestrial community types and three upland rangeland types (table 2.24). We estimated current departures for terrestrial community types that comprised at least one percent of the subbasin area for any output period of the historical simulated run, current period, or 100-year projection of an alternative.

Because their historical occurrences were typically underestimated and their current occurrences typically overestimated (Hann and others, in press; Jones and Hann 1996), the following communities were not included in the determination of departure values:

- Anthropogenic community types such as cropland, exotic herbland, and urban areas.
- Community types that remained relatively stable between historical and current periods such as alpine, rock/barren, and water types.
- Riparian community types.

Terrestrial community departures were determined by comparing the current and projected future areal extent of each type to modeled 75th and 100th percentile historical ranges of each type. Historical ranges were developed for individual subbasins using a single 400-year run of CRBSUM, and cover type and structural stage outputs for historical years 0, 50, 100, 200, 300, and 400. Initial conditions for the historical CRBSUM run and the methods for simulation are described in Long and others (1996).

Minimum and maximum values from the simulation were used to define the historical range. We then calculated the 75th percentile historical mid-range by adding or subtracting 12.5 percent of the historical range to the historical minimum and historical maximum, respectively. Five departure classes were defined based on the relationships between the current and projected future areas of each community type, relative to the simulated 75th and 100th percentile historical ranges (table 2.37, figure 2.48).

Current and projected alternative future departures of the 12 terrestrial community types for each subbasin were mapped using a computerized geographical inventory system (GIS) (Hann and others, in press). The 84 maps were then assessed for gross patterns of community departures across the Basin. The spatial distribution of community departures was summarized using the ERUs of the Basin developed by Jensen and others (in press).

We feel the errors in mapping the management prescriptions in Alternatives 2 and 7 discussed earlier in this chapter do not result in significant inaccuracies in this departure analysis. The community groups selected and the analytical techniques should substantially dampen the effects of those errors.

Results of Evaluating Terrestrial Community Departures

Percentages relative to the historical mid-range of a community in the following discussions relate to the increase or decrease from the current percent of communities in departure class 3, which is the historical mid-range, to the projected percent for the subject alternative. For example, for the early-seral lower montane forest discussed directly below for Alternative 1, the 1,000 percent increase relates to the increase from 4 to 47 percent of the subbasins having that community within their historical mid-range.

Alternative 1 Departures

Alternative 1 would decrease the average frequency of subbasin membership in class 1 and class 5 departures to 27 and 25 percent, respectively (table 2.38). Similarly, the average frequency of communities within class 3 departures would increase to 36 percent. The 100-year projection for Alternative 1 indicated that the mid-seral lower montane forest, mid-seral montane forest, and upland woodland communities would differ the most in a positive direction from their historical conditions; at least 50 percent of the subbasins would contain these communities at levels well above their historical mid-ranges. The early-seral montane and two upland communities, herbland and shrubland, would deviate the most in a negative direction; at least 59 percent of the subbasins would contain these communities at levels well below their historical mid-ranges (tables 2.39 and 2.40).

<u>Montane Community Departures in Alternative 1</u> —

Early-seral Lower Montane Forest. The 100-year projection for Alternative 1 indicated that the availability of the early-seral lower montane forest community would increase substantially from the current conditions. The number of subbasins having this community within its historical mid-range would increase by over 1,000 percent (table 2.39). This increase would primarily occur throughout the Northern Glaciated Mountains, Lower Clark Fork, Central Idaho Mountains, Blue Mountains, Northern Great

Basin, Columbia Plateau, and Southern Cascades ERUs (map 2.24).[1]

Mid-seral Lower Montane Forest. The 100-year projection of Alternative 1 indicated that virtually all subbasins in the Basin would contain the mid-seral lower montane forest community at a level well above its historical mid-range (table 2.39). This community's areal extent would dramatically increase across much of the forested areas of the Upper Columbia River Basin EIS area (UCRB), and also within the Upper Klamath ERU and adjacent areas of the Eastside EIS area (EEIS).

Late-seral Lower Montane Forest. Alternative 1 would increase the areal extent of this community substantially in respect to the current period. The number of subbasins having the late-seral lower montane forest community within its historical mid-range would increase by over 400 percent (table 2.39). This increase would occur predominantly within the Columbia Plateau, Blue Mountains, Northern Glaciated Mountains, Upper Clark Fork, and Central Idaho Mountains ERUs. However, the areal extent of this community would decrease well below its historical mid-range throughout a substantial portion of the Southern Cascades ERU.

Early-seral Montane Forest. Alternative 1 would increase the number of subbasins having this community within its historical mid-range by 61 percent (table 2.39). However, the increasing trend would not be consistent across the Basin. Alternative 1 would result in a substantial areal increase of early-seral montane forests within many subbasins of the Northern Glaciated Mountains, Lower Clark Fork, Upper Clark Fork, Upper Snake, and Snake Headwaters ERUs, whereas a substantial areal decline would occur within the Northern Cascades, Blue Mountains, and Central Idaho Mountains ERUs.

Mid-seral Montane Forest. The 100-year projection for Alternative 1 indicated that the number of subbasins having the mid-seral montane forest community within its historical mid-range would increase by 61 percent (table 2.39). This would predominantly be attributed to an areal increase in mid-seral montane forests throughout the Central Idaho Mountains and Upper Klamath ERUs. Conversely, we projected areal declines of this community throughout many subbasins within the Northern Glaciated Mountains and Upper Clark Fork ERUs.

Late-seral Montane Forest. Alternative 1 would increase the number of subbasins having the late-seral montane forest community within its historical mid-range by almost 390 percent (table 2.39). This increase would predominantly be due to areal increases in late-seral forests throughout the North Cascades, Upper Clark Fork, Central Idaho Mountains, and Snake Headwaters ERUs. Areal declines of the late-seral montane community within the Southern Cascades and Upper Klamath ERUs would also increase the frequency of subbasins having this community within its historical mid-range. The Blue Mountains and Columbia Plateau ERUs would contain some subbasins with increases and others with decreases, which would increase the frequency of subbasins having the late-seral montane forest community within its historical mid-range.

Subalpine Community Departures in Alternative 1 —

Early-seral Subalpine Forest. The 100-year projection for Alternative 1 suggested that the number of subbasins having the early-seral subalpine forest community within its historical mid-range would increase by 180 percent (table 2.39). This increase would largely be due to areal declines in early-seral subalpine forests throughout the Central Idaho Mountains, Blue Mountains, and Snake Head-

[1]A total of 13 ERUs were delineated for the Basin based on terrestrial and aquatic biophysical environment, as well as social/economic criteria. These delineations were used extensively by the different Science Integration Team (SIT) staff areas in the reporting of assessment results at the regional level.

waters ERUs. An areal increase of the early-seral subalpine forest community within the Northern Glaciated Mountains ERU would also increase the frequency of subbasins having this community within its historical mid-range.

Mid-seral Subalpine Forest. The frequency of subbasins having the mid-seral subalpine forest community within its historical mid-range would increase by 170 percent for the 100-year projection of Alternative 1 (table 2.39). This increase would primarily be due to areal increases of mid-seral subalpine forests throughout the Upper Klamath and Central Idaho ERUs. Areal declines of this community in several subbasins of the Upper Clark Fork ERU, and to a lesser extent the Northern Glaciated Mountains ERU, would also increase the frequency of subbasins having this community within its historical mid-range.

Late-seral Subalpine Forest. Alternative 1 would increase the frequency of subbasins having the late-seral subalpine forest community within its historical mid-range by 367 percent (table 2.39). This increase would predominantly be due to an areal increase of late-seral subalpine forests throughout the Northern Cascades, Northern Glaciated Mountains, Lower Clark Fork, Upper Clark Fork, Central Idaho Mountains, and Upper Snake ERUs. Areal declines of this community in several subbasins of the Upper Klamath would also increase the frequency of subbasins having this community within its historical mid-range.

Upland Community Departures in Alternative 1 —

Upland Herbland. The 100-year projection for Alternative 1 suggested that the frequency of subbasins having areas of the upland herbland community within its historical mid-range would increase by 117 percent (table 2.40). This increase would largely be due to an areal increase of upland herbland within the Columbia Plateau, Northern Great Basin, and Owyhee Uplands ERUs.

Upland Shrubland. The 100-year projection for Alternative 1 indicated that the frequency of subbasins having an areal extent of the upland herbland community within its historical mid-range would remain about the same as the current period (table 2.40). However, the spatial distribution of these subbasins would change substantially. The most obvious changes would be an increase in class 3 subbasins within the Central Idaho Mountains ERU, and a decrease in class 3 subbasins within the western portion of the Northern Great Basin ERU.

Upland Woodland. Alternative 1 would increase the frequency of subbasins containing areas of the upland woodland community within its historical mid-range by 62 percent (table 2.40). However, those subbasins having a substantial component of this community would be dominated by class 5 departures. The increased number of subbasins falling within the historical mid-range would largely be due to areal increases of the upland

Table 2.37—Terrestrial community departure classes.

Departure Class	Relationship of Current Area to Historical Ranges
1	Current area is smaller than minimum historical range.
2	Current area is equal to or greater than historical minimum, and equal to or less than 75 percent historical mid-range.
3	Current area is within 75 percent of historical mid-range.
4	Current area is greater than 75 percent historical mid-range, and equal to or less than historical maximum.
5	Current area is greater than historical maximum.

woodland community within subbasins of the Central Idaho Mountains ERU. In addition, areal declines of upland woodland in the Columbia Plateau and Owyhee Uplands ERUs would also contribute to an increased frequency of class 3 subbasins.

Alternative 2 Departures

Alternative 2 would decrease the average frequency of subbasin membership in class 1 and class 5 departures to 27 and 25 percent, respectively (table 2.38). Similarly, the average frequency of communities within class 3 departures would increase to 36 percent. The 100-year projection for Alternative 2 suggested that the mid-seral lower montane forest and upland woodland communities would deviate the most, in a positive direction, from historical conditions; at least 72 percent of the subbasins would contain these communities at levels well above their historical mid-ranges. The upland herbland and upland shrubland communities would deviate the most in a negative direction; at least 63 percent of the subbasins would contain these communities at levels well below their historical mid-ranges (tables 2.39 and 2.40).

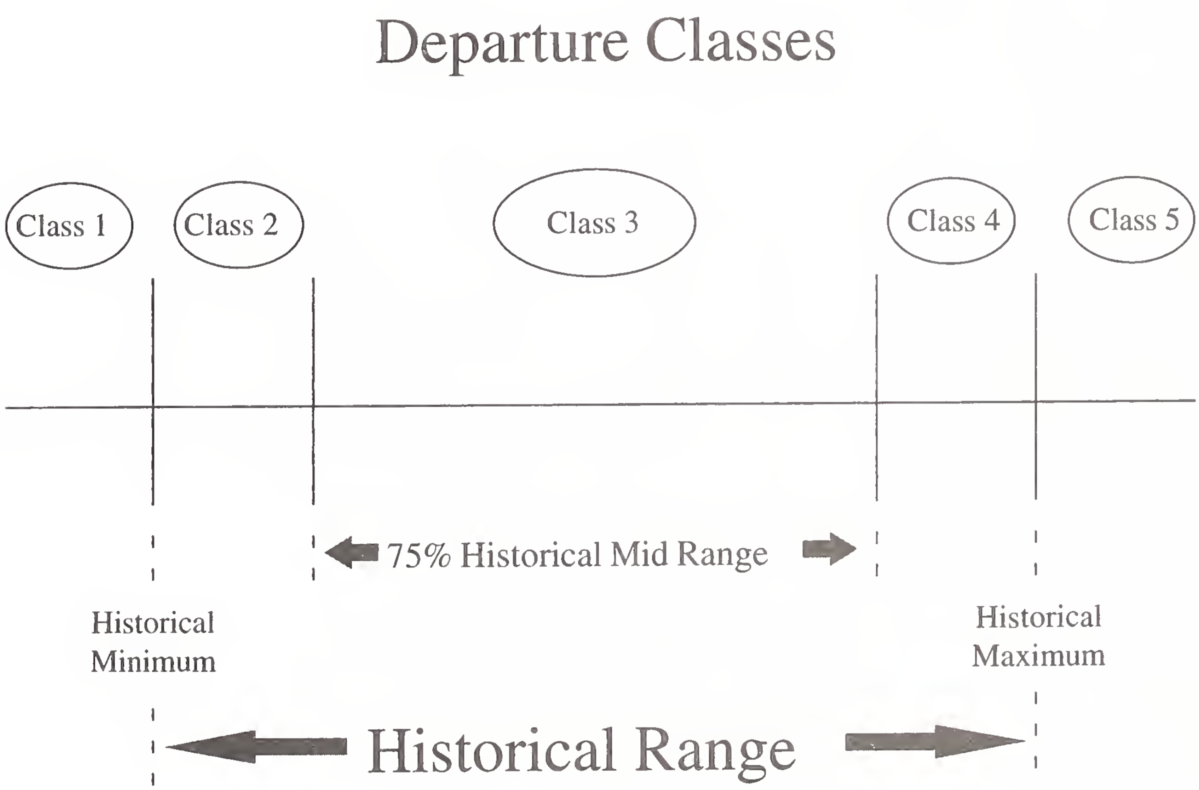


Figure 2.48 — Relationship between current areal extent of broad-scale terrestrial communities and their respective historical ranges.

Table 2.38 — Average subbasin frequency distribution across 12 terrestrial community group departure classes.

Alternative	Percent of Subbasin by Departure Class[1]				
	1	2	3	4	5
Current	47.6	8.3	13.8	2.3	28.0
1	27.0	8.8	35.8	3.7	24.8
2	26.9	8.7	35.8	3.6	25.1
3	27.3	8.8	32.4	4.2	27.3
4	27.6	8.6	31.9	4.4	27.5
5	26.8	8.7	33.7	3.9	26.9
6	26.6	9.3	33.7	4.2	26.4
7	25.2	8.0	40.6	3.3	22.8

[1]Departure class: See table 2.37 and figure 2.48.
Due to rounding, total percents of departures classes may sum to more or less than 100 percent.

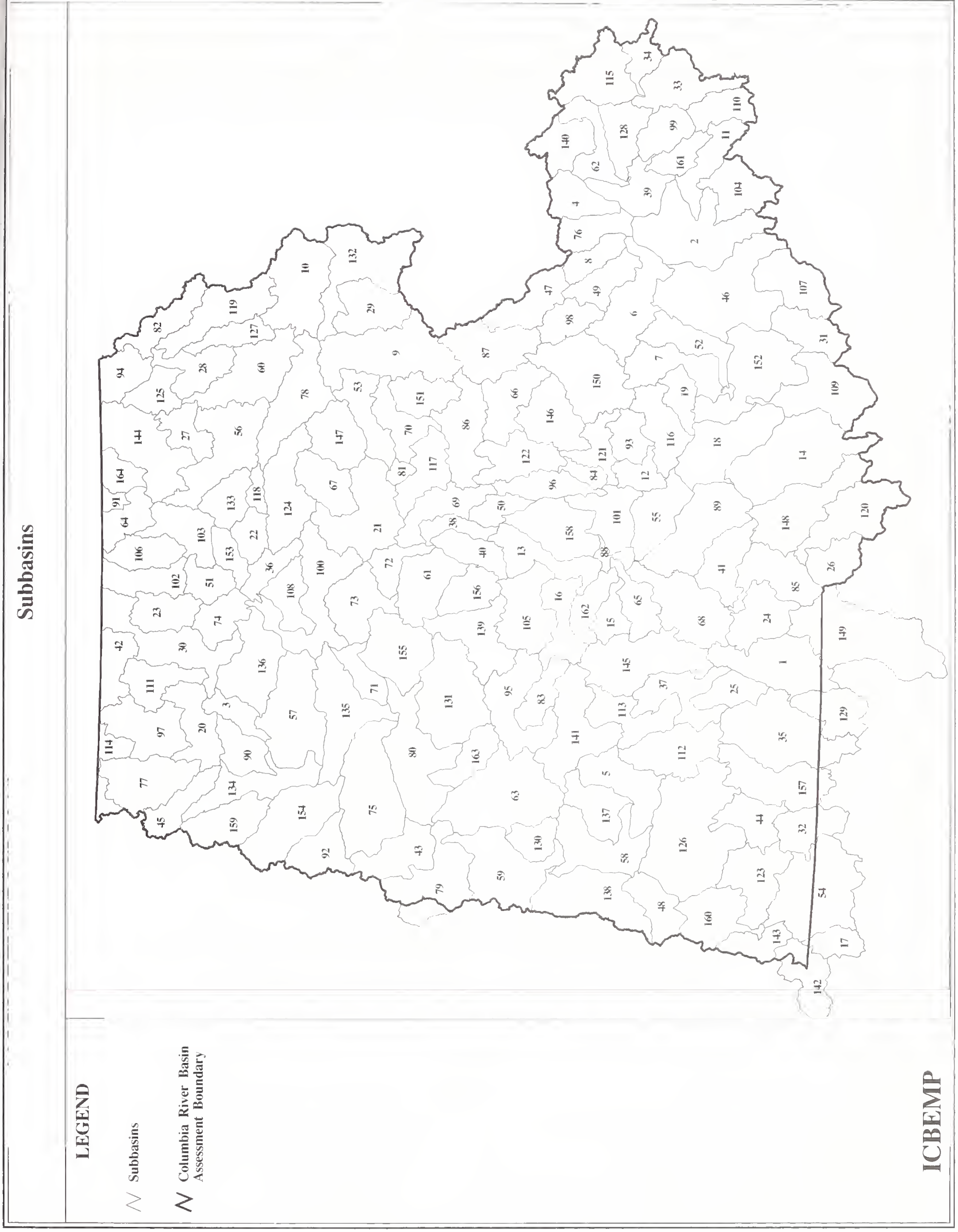
Montane Community Departures in Alternative 2 —

Early-seral Lower Montane Forest. The 100-year projection for Alternative 2 indicated that the availability of the early-seral lower montane forest community would increase substantially from the current conditions; the number of subbasins having this community within its historical mid-range would increase by 950 percent (table 2.39). This would largely occur throughout the Northern Glaciated Mountains, Lower Clark Fork, Central Idaho Mountains, Blue Mountains, Northern Great Basin, and Columbia Plateau ERUs.

Mid-seral Lower Montane Forest. The 100-year projection of Alternative 2 indicated that virtually all subbasins within the Basin would contain the mid-seral lower montane forest community at a level well above its historical mid-range (table 2.39). The areal extent of this community would increase dramatically across much of the forested areas of the Upper Columbia River Basin, and also within the Upper Klamath ERU and adjacent areas of the Eastside EIS area.

Late-seral Lower Montane Forest. Alternative 2 would substantially increase the availability of the late-seral lower montane forest community above the current conditions. The number of subbasins having the areal extent of this community type within its historical mid-range would increase by over 400 percent (table 2.39). Its areal increase would occur predominantly within the Columbia Plateau, Blue Mountains, Northern Glaciated Mountains, Upper Clark Fork, and Central Idaho Mountains ERUs. However, the area of the late-seral lower montane forest community would decrease to a point well below its historical mid-range throughout a substantial portion of the Southern Cascades ERU.

Early-seral Montane Forest. Alternative 2 would increase the number of subbasins having the early-seral montane forest community within its historical mid-range by 83 percent. However, this increasing trend would not be consistent across all subbasins within the Basin (table 2.39). Alternative 2 would result in a substantial areal increase of early-seral montane forests within many subbasins of the Northern Glaciated Mountains, Lower Clark Fork, Upper Clark Fork, Upper Klamath, Upper Snake, and Snake Headwaters ERUs. However, substantial areal declines of these forests would occur within the Blue Mountains and Central Idaho Mountains ERUs. In addition, the early-seral montane forest community would decrease substantially throughout the northern half of the Northern Cascades ERU, but increase substantially within its southern half.



Map 2.23 – Subbasins (4th field hydrologic unit codes) of the Basin. There are 164 subbasins and portions of subbasins in the Basin, and they range from approximately 500,000 to 1,000,000 hectares in size. This stratification was the basic data element for addressing ecological integrity and landscape patterns.

Table 2.39 — Summary of subbasin frequency distribution by current and projected future (alternative year 100) forest terrestrial community group departures.

Terrestrial Community Group	Alternative	Number of Subbasins[1]	Percent Subbasin by Departure Class[2]				
			1	2	3	4	5
Lower Montane Early-seral Forest	Current	117	79	15	4	1	2
	1	119	20	19	47	3	11
	2	118	31	20	42	1	7
	3	118	17	20	45	3	15
	4	118	17	21	45	2	15
	5	118	19	20	42	3	15
	6	118	19	22	42	2	15
	7	119	30	17	45	0	8
Lower Montane Mid-seral Forest	Current	125	23	5	10	3	58
	1	124	0	0	2	2	95
	2	124	0	0	6	2	92
	3	124	0	0	10	9	81
	4	124	0	0	12	6	81
	5	124	0	0	10	7	83
	6	124	0	0	12	6	82
	7	124	0	0	13	4	83
Lower Montane Late-seral Forest	Current	125	78	8	7	0	6
	1	125	45	8	38	3	6
	2	125	48	4	37	3	8
	3	125	37	8	35	5	15
	4	125	37	10	34	5	15
	5	125	39	7	36	4	14
	6	125	39	8	33	6	14
	7	125	41	6	37	4	12
Montane Early-seral Forest	Current	136	44	7	18	4	28
	1	136	51	8	29	1	11
	2	135	32	8	33	4	23
	3	135	41	11	30	2	16
	4	135	42	13	26	1	17
	5	135	40	12	31	1	16
	6	135	42	12	30	1	16
	7	135	32	8	34	4	22
Montane Mid-seral Forest	Current	133	19	3	19	2	57
	1	130	2	2	34	12	51
	2	130	5	5	38	12	40
	3	130	3	5	42	11	39
	4	130	3	4	44	12	38
	5	130	1	5	42	12	41
	6	130	1	6	42	10	41
	7	130	11	5	46	6	32

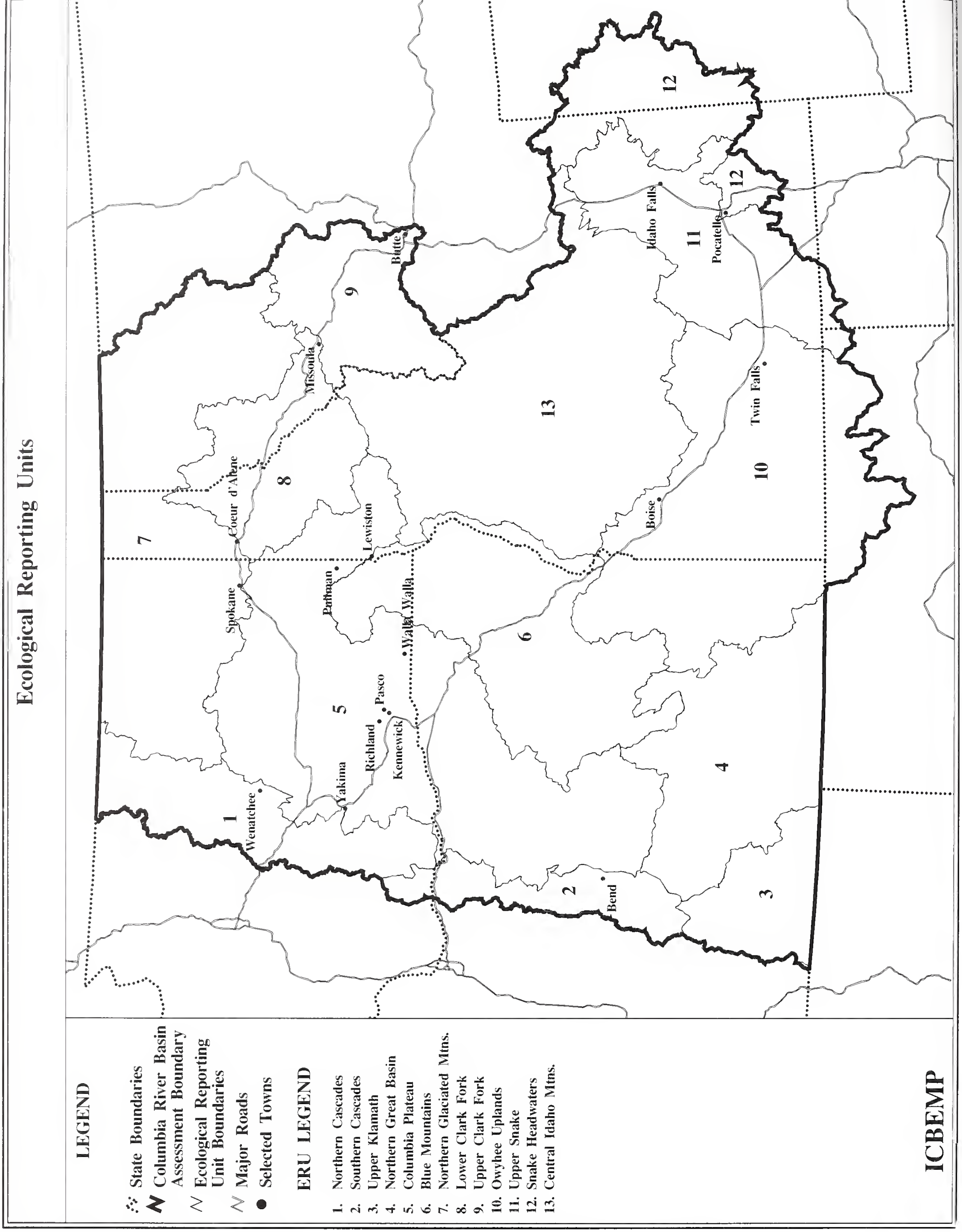
Table 2.39 (continued)

Terrestrial Community Group	Alternative	Number of Subbasins[1]	Percent Subbasin by Departure Class[2]				
			1	2	3	4	5
Montane Late-seral Forest	Current	127	59	4	9	1	27
	1	126	34	10	44	2	9
	2	128	27	9	43	5	15
	3	127	30	7	46	4	13
	4	127	30	6	45	6	13
	5	127	28	11	44	4	13
	6	127	28	8	46	5	14
	7	128	23	4	48	6	19
Subalpine Early-seral Forest	Current	75	21	3	20	0	56
	1	70	9	13	56	6	17
	2	70	9	14	54	6	17
	3	72	4	10	29	4	53
	4	73	3	10	26	5	56
	5	73	4	8	38	4	45
	6	71	4	13	38	7	38
	7	70	11	14	66	1	7
Subalpine Mid-seral Forest	Current	90	38	9	20	3	30
	1	92	13	9	54	3	21
	2	91	16	16	48	5	13
	3	90	28	9	42	4	17
	4	90	29	7	42	4	18
	5	90	28	7	46	3	17
	6	90	29	6	44	3	18
	7	90	13	10	60	4	12
Subalpine Late-seral Forest	Current	91	63	9	12	0	16
	1	91	23	10	56	3	8
	2	91	20	11	57	0	12
	3	91	37	8	45	1	9
	4	91	35	9	46	1	9
	5	91	35	7	47	3	8
	6	91	30	11	48	1	10
	7	91	12	10	51	4	23

[1]Subbasins (4th field HUCs) having at least 1 percent of the terrestrial community group.

[2]Departure class: See table 2.37 and figure 2.48.
Due to rounding, total percents of departure classes may sum to more or less than 100 percent.

Mid-seral Montane Forest. The number of subbasins having the mid-seral montane forest community within its historical mid-range would nearly double as a result of implementing Alternative 2 (table 2.39). The increased number of subbasins falling within the historical mid-range would primarily be due to areal increases in mid-seral montane forests throughout the Central Idaho Mountains, Upper Klamath, and Northern Great Basin ERUs. In addition, our projected declines of this community throughout many subbasins within the Northern Glaciated Mountains, Lower Clark Fork, and Upper Clark Fork ERUs would also increase the frequency of class 3 departures.



Map 2.24 – The Ecological Reporting Units (ERUs) of the Basin. ERUs are aggregates of subwatersheds (6th field hydrologic unit codes) that generally represent similar terrestrial and aquatic characteristics.

Table 2.40 — Summary of subbasin frequency distribution (percent) by current and future (alternative year 100) range community group departure classes.

Terrestrial Community Group	Alternative	Number of Subbasins[1]	Percent Subbasin by Departure Class[2]				
			1	2	3	4	5
Upland Herbland	Current	145	66	15	12	0	7
	1	145	59	9	26	3	3
	2	145	63	6	31	0	1
	3	145	61	7	29	2	1
	4	145	61	6	26	4	3
	5	145	61	6	30	1	1
	6	145	59	9	26	3	3
	7	145	56	5	37	0	3
Upland Shrubland	Current	129	47	14	22	8	9
	1	128	63	13	22	2	1
	2	128	70	10	18	2	1
	3	128	62	15	20	2	1
	4	128	65	12	20	2	1
	5	128	62	16	20	2	1
	6	128	63	13	22	2	1
	7	129	65	12	22	0	1
Upland Woodland	Current	104	34	7	13	6	40
	1	94	5	4	21	4	65
	2	95	2	1	22	3	72
	3	94	7	5	16	3	68
	4	94	9	5	17	5	64
	5	94	4	5	18	3	69
	6	94	5	4	21	4	65
	7	98	8	5	28	7	52

[1]Subbasins (4th field HUCs) having at least 1 percent of the terrestrial community group.

[2]Departure class: See table 2.37 and figure 2.48.

Due to rounding, the percent totals for departure classes may sum to more or less than 100 percent.

Late-seral Montane Forest. The 100-year projection for Alternative 2 indicated that the number of subbasins having the late-seral montane forest community within its historical mid-range would increase by 378 percent (table 2.39). This increase would largely be due to areal increases in late-seral forests throughout the North Cascades, Lower Clark Fork, Upper Clark Fork, Central Idaho Mountains, and Snake Headwaters ERUs. Areal decreases in the late-seral montane community within the Southern Cascades and Upper Klamath ERUs would also increase the frequency of subbasins having this community within its historical mid-range. The Blue Mountains and Columbia Plateau ERUs would have some subbasins with areal increases and others with areal declines, which would increase the frequency of subbasins having this community within its historical mid-range.

Subalpine Community Departures in Alternative 2 —

Early-seral Subalpine Forest. Alternative 2 would increase the number of subbasins having the early-seral subalpine forest community within its historical mid-range by 170 percent (table 2.39). This increase would primarily be a result of areal decreases in early-seral subalpine forests throughout the Central Idaho Mountains, Blue

Mountains, and Snake Headwaters ERUs. Areal increases of the early-seral subalpine forest community within the Northern Glaciated Mountains ERU would also increase the frequency of subbasins having this community within its historical mid-range.

Mid-seral Subalpine Forest. The frequency of subbasins having the mid-seral subalpine forest community within its historical mid-range would increase by 140 percent as a result of implementing Alternative 2 (table 2.39). This increase would largely be due to an increase of mid-seral subalpine forests throughout the Southern Cascades and Central Idaho Mountains ERUs. Areal declines of this community in several subbasins of the Lower Clark Fork, Upper Clark Fork, and the Northern Glaciated Mountains ERUs would also increase the frequency of subbasins having the mid-seral subalpine forest community within its historical range mid-range.

Late-seral Subalpine Forest. Alternative 2 would increase the frequency of subbasins having the late-seral subalpine forest community within its historical mid-range by 375 percent (table 2.39). This increase would predominantly be due to areal increases of late-seral subalpine forests throughout the Northern Cascades, Northern Glaciated Mountains, Lower Clark Fork, Upper Clark Fork, Central Idaho Mountains, and Upper Snake ERUs. Conversely, the areal declines of this community in several subbasins of the Upper Klamath and Central Idaho Mountains ERUs would also increase the frequency of subbasins having this community within its historical mid-range.

Upland Community Departures in Alternative 2 —

Upland Herbland. The 100-year projection for Alternative 2 indicated that the frequency of subbasins having areas of upland herbland community at levels within its historical mid-range would increase by 158 percent relative to the current period (table 2.40). This increase would mostly be attributed to the areal increase of upland herbland within the Columbia Plateau, Northern Great Basin, and Owyhee Uplands ERUs.

Upland Shrubland. Relative to the current period, Alternative 2 would not substantially change the frequency of subbasins having the upland shrubland community within its historical mid-range (table 2.40). However, the spatial distribution of these subbasins would change substantially. The most obvious changes expected would be an increase of class 3 subbasins in the Central Idaho Mountains ERU, and a decrease of class 3 subbasins in the western portion of the Northern Great Basin ERU.

Upland Woodland. Alternative 2 would increase the frequency of subbasins having areas of the upland woodland community within its historical mid-range by 69 percent (table 2.40). However, as with the current period, the Basin would still be dominated by class 5 departures. The increased number of those subbasins falling within the historical mid-range would predominantly be due to areal increases of the upland woodland community within subbasins of the Central Idaho Mountains ERU. In addition, the areal declines of upland woodland in the Columbia Plateau and Owyhee Uplands ERUs would also contribute to an increased frequency of class 3 subbasins.

Alternative 3 Departures

Alternative 3 would decrease the average frequency of subbasin memberships in class 1 and class 5 departures to 27 percent (table 2.38). Similarly, the average frequency of communities within class 3 departures would increase to 32 percent. The 100-year projection for Alternative 3 indicated that the mid-seral lower montane forest, early-seral subalpine forest, and upland woodland communities would deviate the most, in a positive direction, from historical conditions; at least 53 percent of the subbasins would contain these communities at levels well above their historical mid-ranges. Two upland communities, herbland and shrubland, would deviate the most in a negative direction; at least 61 percent of the subbasins

would contain these communities at levels well below their historical mid-ranges (tables 2.39 and 2.40).

Montane Community Departures in Alternative 3 —

Early-seral Lower Montane Forest. The 100-year projection for Alternative 3 indicated that the availability of the early-seral lower montane forest community would increase substantially from the current conditions; the number of subbasins having this community within its historical mid-range would increase by over 1,000 percent (table 2.39). This increase would largely occur primarily throughout the Northern Glaciated Mountains, Lower Clark Fork, Central Idaho Mountains, Blue Mountains, Northern Great Basin, and Columbia Plateau ERUs.

Mid-seral Lower Montane Forest. The 100-year projection for Alternative 3 indicated that virtually all subbasins within the Basin would contain the mid-seral lower montane forest community at a level well above its historical mid-range (table 2.39). This community would increase substantially across much of the forested areas of the Upper Columbia River Basin area, within the Upper Klamath ERU, and in adjacent areas of the Eastside EIS area.

Late-seral Lower Montane Forest. Alternative 3 would increase the availability of the late-seral lower montane forest community substantially from its current condition; the number of subbasins having this community within its historical mid-range would increase by over 400 percent (table 2.39). The increased number of subbasins having areas of this community type within its historical mid-range would occur predominantly within the Columbia Plateau, Blue Mountains, Northern Glaciated Mountains, Upper Clark Fork, and Central Idaho Mountains ERUs.

Early-seral Montane Forest. The 100-year projection for Alternative 3 indicated that the number of subbasins having the early-seral montane forest within its historical mid-range would increase by 67 percent (table 2.39). However, the trends of this community would vary spatially across the Basin. Alternative 3 would result in a substantial increase of early-seral montane forests within many subbasins of the Northern Glaciated Mountains (especially in the north Idaho and northwestern Montana portions), Lower Clark Fork, Upper Clark Fork, Upper Klamath, Upper Snake, and Snake Headwaters ERUs. However, there would be a substantial decrease of the early-seral montane forests within the Blue Mountains and Central Idaho Mountains ERUs. In addition, the areal extent of the early-seral montane forest community would decrease substantially throughout the northern half of the Northern Cascades ERU, but increase substantially within its southern half.

Mid-seral Montane Forest. Although Alternative 3 would increase the number of subbasins having the mid-seral montane forest community within its historical mid-range by 121 percent, half of the subbasins would still contain areas of this community above its historical mid-range (table 2.39). The increased number of subbasins falling within the historical mid-range would be due predominantly to areal increases in mid-seral forests throughout the Central Idaho Mountains and Upper Klamath ERUs. In addition, we projected areal declines of this community throughout many subbasins within the Northern Glaciated Mountains, Lower Clark Fork, and Upper Clark Fork ERUs, which would also increase the frequency of subbasins having this community within its historical mid-range.

Late-seral Montane Forest. The 100-year projection for Alternative 3 suggested that the number of subbasins having the late-seral montane forest community within its historical mid-range would increase by 411 percent (table 2.39). This increase would occur largely because of areal increases in late-seral montane forests throughout the Lower Clark Fork, Upper Clark Fork, Central Idaho Mountains, and Snake Headwaters ERUs. Areal declines in the late-seral montane forest community within the Southern Cascades and Upper Klamath ERUs would also increase the frequency

of subbasins having this community within its historical mid-range.

The Blue Mountain and Columbia Plateau ERUs would contain some subbasins with upward trends and others with downward trends, which would also increase the frequency of subbasins having the late-seral montane forest within its historical mid-range.

Subalpine Community Departures in Alternative 3 —

Early-seral Subalpine Forest. Alternative 3 would increase the frequency of subbasins having the early-seral subalpine forest community within its historical mid-range by 45 percent, yet the Basin would still be dominated by subbasins where this community would occur well above its historical mid-range (table 2.39). The increased number of subbasins falling within the historical mid-range would predominantly be due to areal declines of early-seral forests throughout the northern portion of the Central Idaho Mountains ERU.

Mid-seral Subalpine Forest. The frequency of subbasins having the mid-seral subalpine forest community within its historical mid-range would increase by 110 percent for the 100-year projection of Alternative 3 (table 2.39). This increase would predominantly be due to increases of mid-seral subalpine forests throughout the Central Idaho Mountains ERU. Areal declines of this community that would occur in several subbasins of the Lower and Upper Clark Fork ERUs would also increase the frequency of subbasins having this community within its historical mid-range.

Late-seral Subalpine Forest. Alternative 3 would increase the proportion of subbasins having the late-seral subalpine forest community within its historical mid-range by 275 percent (table 2.39). This increase would predominantly be due to areal increases of late-seral subalpine forests throughout the Northern Glaciated Mountains, Lower Clark Fork, and Upper Clark Fork ERUs. Areal declines that would occur in several subbasins of the Upper Klamath and Central Idaho Mountains ERUs would also increase the frequency of subbasins having this community within its historical mid-range.

Upland Community Departures in Alternative 3 —

Upland Herbland. The 100-year projection for Alternative 3 indicated that the frequency of subbasins having areas of the upland herbland community within its historical mid-range would increase by 142 percent (table 2.40). This increase would predominantly occur within the Columbia Plateau, Northern Great Basin, and Owyhee Uplands ERUs.

Upland Shrubland. Alternative 3 would decrease the frequency of subbasins having the upland shrubland community within its historical mid-range by approximately 9 percent (table 2.40). This decrease would be attributed primarily to the loss of upland shrubland across subbasins within the Northern Great Basin. However, an increase of class 3 subbasins was projected within the Central Idaho Mountains and Snake Headwater ERUs.

Upland Woodland. The 100-year projection for Alternative 3 indicated that the frequency of subbasins having areas of the upland woodland community within its historical mid-range would increase by 23 percent (table 2.40). However, the Basin would still be dominated by subbasins having this community well above its historical mid-range. The increased number of subbasins falling within the historical mid-range would predominantly be due to areal increases in upland woodland within subbasins of the Central Idaho Mountains ERU.

Alternative 4 Departures

Alternative 4 would decrease the average frequency of subbasin membership in class 1 and class 5 departures to 28 percent (table 2.38). Similarly, the average frequency of communities within class 3 departures would increase to 33 percent. The

100-year projection for Alternative 4 indicated that the mid-seral lower montane forest, early-seral subalpine forest, and upland woodland communities would deviate the most, in a positive direction, from historical conditions; at least 56 percent of the subbasins would contain these communities at levels well above their historical mid-ranges. The upland herbland and upland shrubland communities would deviate the most in a negative direction; at least 61 percent of the subbasins would contain these communities at levels well below their historical mid-ranges (tables 2.39 and 2.40).

<u>Montane Community Departures in Alternative 4</u> —

Early-seral Lower Montane Forest. The 100-year projection for Alternative 4 indicated that the availability of the early-seral lower montane forest community would increase substantially from the current conditions; the number of subbasins having areas of this community within its historical mid-range would increase by over 1,000 percent (table 2.39). This increase would primarily occur throughout the Northern Glaciated Mountains, Lower Clark Fork, Central Idaho Mountains, Blue Mountains, Northern Great Basin, and Columbia Plateau ERUs.

Mid-seral Lower Montane Forest. This community would occur well above its historical mid-range in virtually all subbasins of the Basin after 100 years of implementing Alternative 4 (table 2.39). The mid-seral lower montane forest would increase substantially across much of the forested areas of the Upper Columbia River Basin area, within the Upper Klamath ERU, and in adjacent areas of the Eastside EIS area.

Late-seral Lower Montane Forest. The 100-year projection for Alternative 4 indicated that the availability of the late-seral lower montane forest community would increase substantially from the current conditions. The number of subbasins having this community within its historical mid-range would increase by approximately 385 percent (table 2.39). This increase would occur predominantly within the Columbia Plateau, Blue Mountains, Northern Glaciated Mountains, Upper Clark Fork, and Central Idaho Mountains ERUs.

Early-seral Montane Forest. Alternative 4 would increase the number of subbasins containing the early-seral montane forest community within its historical mid-range by 44 percent. However, spatial variations across the Basin were apparent (table 2.39). Alternative 4 would result in a substantial increase of early-seral montane forests within many subbasins of the Northern Glaciated Mountains (especially in the north Idaho and northwestern Montana portions), Lower Clark Fork, Upper Clark Fork, Upper Klamath, Upper Snake, and Snake Headwaters ERUs. However, there would be a substantial areal decline of the early-seral montane forest community within the Blue Mountains and Central Idaho Mountains ERUs. The early-seral montane forest community would decrease substantially throughout the northern half of the Northern Cascades ERU, but increase substantially within the southern half.

Mid-seral Montane Forest. Alternative 4 would increase the number of subbasins having the mid-seral montane forest community within its historical mid-range by 132 percent (table 2.39). This increase would predominantly be due to increases in mid-seral forest throughout the Central Idaho Mountains and Upper Klamath ERUs. Areal declines of this community were projected throughout many subbasins within the Northern Glaciated Mountains, Lower Clark Fork, and Upper Clark Fork ERUs, which also would increase the frequency of subbasins having this community within its historical mid-range.

Late-seral Montane Forest. The 100-year projection for Alternative 4 suggested that the number of subbasins having the late-seral montane forest community within its historical mid-range would increase by 400 percent (table 2.39). This increase would largely be due to increases in the late-seral montane forest community throughout the Lower Clark Fork, Upper Clark Fork, Central Idaho Mountains, and Snake Headwaters ERUs. Areal

declines of the late-seral montane forest community within the Southern Cascades and Upper Klamath ERUs would also increase the frequency of subbasins having this community at a level within its historical mid-range. The Blue Mountains and Columbia Plateau ERUs would have some subbasins with increases and others with decreases, which would also increase the frequency of subbasins having the late-seral montane forest community within its historical mid-range.

Subalpine Community Departures in Alternative 4 —

Early-seral Subalpine Forest. Alternative 4 would increase the number of subbasins having the early-seral subalpine forest community within its historical mid-range by 30 percent. However, the Basin would still be dominated by subbasins having this community well above its historical mid-range (table 2.39). The increase of those subbasins that had this community within its historical mid-range would predominantly be due to areal declines in the early-seral forest community throughout the northern portion of the Central Idaho Mountains ERU.

Mid-seral Subalpine Forest. The frequency of subbasins having the mid-seral subalpine forest community within its historical mid-range increased by 110 percent for the 100-year projection of Alternative 4 (table 2.39). This increase was largely due to areal increases in mid-seral subalpine forests throughout the Central Idaho ERU. Areal declines in this community that would occur in several subbasins of the Lower Clark Fork and Upper Clark Fork ERUs would also increase the frequency of subbasins having this community at a level within its historical mid-range.

Late-seral Subalpine Forest. The number of subbasins having the mid-seral subalpine forest community within its historical mid-range increased by 283 percent for the 100-year projection of Alternative 4 (table 2.39). This increase was predominantly due to increases in late-seral subalpine forests throughout the Northern Glaciated Mountains, Lower Clark Fork, Upper Clark Fork, and Snake Headwaters ERUs. Areal declines of this community that would occur in several subbasins of the Upper Klamath and Central Idaho Mountains ERUs would also increase the frequency of subbasins having this community within its historical mid-range.

Upland Community Departures in Alternative 4 —

Upland Herbland. Alternative 4 would increase the frequency of subbasins having the upland herbland community within its historical mid-range by 117 percent (table 2.40). This increase would largely be due to increases in upland herbland within the Columbia Plateau, Northern Great Basin, and Owyhee Uplands ERUs.

Upland Shrubland. The 100-year projection for Alternative 4 indicated that the frequency of subbasins having areas of the upland herbland community at levels within the historical mid-range would decrease by approximately nine percent (table 2.40). This decrease would be attributed primarily to the loss of upland shrubland across subbasins within the Northern Great Basin ERU. However, the simulations indicated an increase of class 3 subbasins within the Snake Headwater ERU.

Upland Woodland. Alternative 4 would increase the number of subbasins having the upland woodland community within its historical mid-range by 31 percent (table 2.40). However, those subbasins having a substantial component of the upland woodland community would be dominated by class 5 departures. The increase of those subbasins falling within the historical mid-range would predominantly be due to increases in the upland woodland community in subbasins within the Central Idaho Mountains and Upper Klamath ERUs. In addition, areal declines of the upland woodland community in the Blue Mountains and Owyhee Uplands ERUs would also contribute to an increased frequency of class 3 subbasins.

Alternative 5 Departures

Alternative 5 would decrease the average frequency of subbasin memberships in class 1 and 5 departures to 27 percent (table 2.38). Similarly, the average frequency of communities within class 3 departures would increase to 34 percent. The 100-year projection for Alternative 5 indicated that the mid-seral lower montane forest and upland woodland communities would deviate the most, in a positive direction, from historical conditions; at least 69 percent of the subbasins would contain these communities at levels well above their historical mid-ranges. The upland herbland and upland shrubland communities would deviate the most in a negative direction; at least 61 percent of the subbasins would contain these communities at levels well below their historical mid-ranges (tables 2.39 and 2.40).

Montane Community Departures in Alternative 5 —

Early-seral Lower Montane Forest. Alternative 5 would substantially increase the availability of the early-seral lower montane forest community relative to current conditions. The number of subbasins containing levels of this community within its historical mid-range would increase by 950 percent (table 2.39). This increase would occur primarily in the Northern Glaciated Mountains, Lower Clark Fork, Central Idaho Mountains, Blue Mountains, Northern Great Basin, and Columbia Plateau ERUs.

Mid-seral Lower Montane Forest. The 100-year projection for Alternative 5 indicated that virtually all subbasins within the Basin would contain the mid-seral lower montane forest community at levels well above its historical mid-range (table 2.39). The areal extent of this community would increase across much of the forested areas of the Upper Columbia River Basin EIS area, within the Upper Klamath ERU, and in areas within the Eastside EIS area adjacent to the Upper Klamath ERU.

Late-seral Lower Montane Forest. Under Alternative 5, the availability of the late-seral lower montane forest community would increase substantially from the current conditions. The number of subbasins that contained levels of this community within its historical mid-range would increase by over 400 percent (table 2.39). The increase of this community type would occur predominantly within the Columbia Plateau, Blue Mountains, Northern Glaciated Mountains, Upper Clark Fork, and Central Idaho Mountains ERUs.

Early-seral Montane Forest. The 100-year projection for Alternative 5 suggested that the number of subbasins having the early-seral montane community within its historical mid-range would increase by 72 percent. However, trends of the early-seral montane forest community were not consistent throughout the Basin (table 2.39). Alternative 5 would result in substantial increases of early-seral montane forests within many subbasins of the Northern Glaciated Mountains (especially in the north Idaho and northwestern Montana portions), Lower Clark Fork, Upper Clark Fork, Upper Klamath, Upper Snake, and Snake Headwaters ERUs. However, there would be substantial areal declines of the community type in the Blue Mountains and Central Idaho Mountains ERUs. Similarly, the early-seral montane forest community would decrease substantially throughout the northern half of the Northern Cascades ERU, but increase substantially within the southern half.

Mid-seral Montane Forest. Alternative 5 would increase the number of subbasins having the mid-seral montane forest community within its historical mid-range by 121 percent (table 2.39). This increase would predominantly be due to increases in mid-seral forests throughout the Central Idaho Mountains and Upper Klamath ERUs. Conversely, we projected decreases in this community throughout many subbasins within the Northern Glaciated Mountains, Lower Clark Fork, Upper Clark Fork, and Snake Headwaters ERUs.

Late-seral Montane Forest. The 100-year projection for Alternative 5 indicated that the number of subbasins having the late-seral montane forest

community within its historical mid-range would increase by 389 percent (table 2.39). Increases where amounts were below HRV would largely occur throughout the Lower Clark Fork, Upper Clark Fork, Central Idaho Mountains, and Snake Headwaters ERUs. Decreases in the late-seral montane forest community within the Southern Cascades and Upper Klamath ERUs where amounts were above HRV would also increase the frequency of subbasins having this community within its historical mid-range. The Blue Mountains and Columbia Plateau ERUs would contain some subbasins with increases and others with decreases, which would improve the frequency of subbasins having the late-seral montane forest community within its historical mid-range.

Subalpine Community Departures in Alternative 5 —

Early-seral Subalpine Forest. Alternative 5 would nearly double the number of subbasins having the early-seral subalpine forest community within its historical mid-range (table 2.39). This increase would largely be due to decreases in the early-seral subalpine forest throughout the Central Idaho Mountains ERU. Increases in the early-seral subalpine forest community within the Northern Glaciated Mountains ERU would also increase the frequency of subbasins having this community at a level within its historical mid-range.

Mid-seral Subalpine Forest. The frequency of subbasins having the mid-seral subalpine forest community within its historical mid-range would increase by 130 percent for the 100-year projection of Alternative 5 (table 2.39). This increase would predominantly be due to increases in mid-seral subalpine forests throughout the Central Idaho ERU. Decreases in this community that would occur in several subbasins of the Lower Clark Fork and Upper Clark Fork ERUs would also increase the frequency of subbasins having this community type at a level within its historical mid-range.

Late-seral Subalpine Forest. Alternative 5 would increase the frequency of subbasins having the mid-seral subalpine forest community within its historical mid-range by 292 percent (table 2.39). This increase would mostly be attributed to increases in late-seral subalpine forests throughout the Northern Glaciated Mountains, Lower Clark Fork, Upper Clark Fork, and Snake Headwaters ERUs. Decreases in this community, which would occur in several subbasins of the Upper Klamath and Central Idaho Mountains, would also increase the frequency of subbasins having this community at historical mid-range levels.

Upland Community Departures in Alternative 5 —

Upland Herbland. The 100-year projection for Alternative 5 indicated that the number of subbasins having the upland herbland community within its historical mid-range would increase by 150 percent relative to the current period (table 2.40). This increase would primarily be due to areal increases in upland herbland within the Columbia Plateau, Northern Great Basin, and Owyhee Uplands ERUs.

Upland Shrubland. Alternative 5 would not increase the frequency of subbasins having the upland herbland community within its historical mid-range; in fact, the frequency of subbasins would decrease by approximately 9 percent (table 2.40). This decrease would be attributed primarily to the loss of the upland shrubland community within subbasins of the Northern Great Basin ERU.

Upland Woodland. The 100-year projection for Alternative 5 indicated that the frequency of subbasins having areas of the upland woodland community within its historical mid-range would increase by 38 percent (table 2.40). However, subbasins having a substantial component of the upland woodland community would still be dominated by class 5 departures. The increased number of subbasins within the historical mid-range would primarily be attributed to areal increases in the upland woodland community within subbasins of the Central Idaho Mountains and Upper Klamath ERUs. In addition, areal declines of

upland woodland in the Owyhee Uplands ERU would contribute to an increased frequency of class 3 subbasins.

Alternative 6 Departures

Alternative 6 would decrease the average frequency of subbasin membership in classes 1 and 5 departures to 26 percent (table 2.38). Similarly, the average frequency of communities within class 3 departures would increase to 34 percent. The 100-year projection for Alternative 6 indicated that the mid-seral lower montane forest and upland woodland communities would differ the most, in a positive direction, from historical conditions; at least 65 percent of the subbasins would contain these communities at levels well above their historical ranges. The upland herbland and upland shrubland communities would diverge the most in a negative direction; at least 59 percent of the subbasins would contain these communities at levels well below their historical ranges (tables 2.39 and 2.40).

Montane Community Departures in Alternative 6 —

Early-seral Lower Montane Forest. The 100-year projection for Alternative 6 indicated that the availability of the early-seral lower montane forest community would increase substantially from the current conditions; the amount of subbasins having levels of this community within its historical mid-range would increase by 950 percent (table 2.39). This increase would largely occur throughout the Northern Glaciated Mountains, Lower Clark Fork, Central Idaho Mountains, Blue Mountains, Northern Great Basin, and Columbia Plateau ERUs.

Mid-seral Lower Montane Forest. The 100-year projection for Alternative 6 indicated that virtually all subbasins within the Basin would contain the mid-seral lower montane forest community at levels well above its historical mid-range (table 2.39). The areal extent of the mid-seral lower montane forest community would increase substantially across much of the forested areas of the Upper Columbia River Basin area, within the Upper Klamath ERU, and in areas within the Eastside EIS area adjacent to the Upper Klamath ERU.

Late-seral Lower Montane Forest. Alternative 6 would substantially increase the availability of the late-seral lower montane forest community relative to the current conditions. The number of subbasins having this community within its historical mid-range would increase by approximately 370 percent (table 2.39). This increase would occur predominantly within the Columbia Plateau, Blue Mountains, Northern Glaciated Mountains, Upper Clark Fork, and Central Idaho Mountains ERUs.

Early-seral Montane Forest. Under Alternative 6, the number of subbasins having the early-seral montane community within its historical mid-range would increase by 67 percent. However, this increasing trend would not be consistent across the Basin. Alternative 6 would result in a substantial increase of this community within many subbasins of the Northern Glaciated Mountains (especially in the north Idaho and northwestern Montana portions), Lower Clark Fork, Upper Clark Fork, Upper Klamath, Upper Snake, and Snake Headwaters ERUs. However, there would be a substantial areal decline within the Blue Mountains and Central Idaho Mountains ERUs. In addition, the early-seral montane forest community would decline substantially throughout the northern half of the Northern Cascades ERU, but increase substantially within the southern half.

Mid-seral Montane Forest. Alternative 6 would increase the number of subbasins having the mid-seral montane forest community within its historical mid-range by 121 percent (table 2.39). This increase would largely be attributed to increases in mid-seral montane forests throughout the northern portion of the Central Idaho Mountains and southern portion of the Upper Klamath ERUs. Conversely, we projected decreases in this community throughout many subbasins within the Northern Glaciated Mountains, Lower Clark Fork, Upper Clark Fork, Blue Mountains, and Snake Headwaters ERUs.

Late-seral Montane Forest. The 100-year projection for Alternative 6 indicated that the frequency of subbasins having the late-seral montane forest community within its 75 percent historical mid-range would increase by 411 percent (table 2.39). This increase would predominantly be due to increases of late-seral montane forests throughout the Northern Glaciated Mountains, Lower Clark Fork, Upper Clark Fork, Central Idaho Mountains, and Snake Headwaters ERUs. Areal declines of the late-seral montane forest community within the Southern Cascades ERU would also increase the frequency of subbasins having this community within its historical mid-range. The Blue Mountains and Columbia Plateau ERUs would contain some subbasins with increases and others with decreases, which would also improve the frequency of subbasins having the late-seral montane forest community within its historical mid-range.

Subalpine Community Departures in Alternative 6 —

Early-seral Subalpine Forest. Alternative 6 would nearly double the number of subbasins having the early-seral subalpine forest community within its historical mid-range (table 2.39). This increase would largely be due to decreases in early-seral forests throughout the Central Idaho Mountains ERU. Areal increases of the early-seral subalpine forest community within the Northern Glaciated Mountains ERU would also increase the frequency of subbasins having this community within its historical mid-range.

Mid-seral Subalpine Forest. The proportion of subbasins having the mid-seral subalpine forest community within its historical mid-range would increase by 120 percent for the 100-year projection of Alternative 6 (table 2.39). This increase would predominantly be due to increases in mid-seral subalpine forests throughout the Central Idaho Mountains and Snake Headwaters ERUs. Expected decreases in this community in several subbasins of the Lower Clark Fork and Upper Clark Fork ERUs would also increase the frequency of subbasins having this community within its historical mid-range.

Late-seral Subalpine Forest. The number of subbasins having the late-seral subalpine forest community within its historical mid-range would increase by 300 percent for the 100-year projection of Alternative 6 (table 2.39). This increase would predominantly be due to increases in late-seral subalpine forests throughout the Northern Glaciated Mountains, Lower Clark Fork, Upper Clark Fork, and Snake Headwaters ERUs. Expected areal decline of this community in several subbasins of the Central Idaho Mountains ERU would also increase the frequency of subbasins having this community at a level within its historical mid-range.

Upland Community Departures in Alternative 6 —

Upland Herbland. The 100-year projection for Alternative 6 indicated that the frequency of subbasins having areas of the upland herbland community within its historical mid-range would increase by 117 percent (table 2.40). This increase would largely be due to areal increases of upland herbland within the Columbia Plateau, Northern Great Basin, and Owyhee Uplands ERUs.

Upland Shrubland. Alternative 6 would not substantially change the frequency of subbasins containing areas of the upland herbland community within its historical mid-range (table 2.40) However, the spatial distribution of class 3 subbasins of the 100-year projection differed substantially from the current period. We observed a loss of class 3 subbasins in the western portion of the Northern Great Basin ERU and across some of the Owyhee Uplands ERU, but an increase of class 3 subbasins within the Central Idaho Mountains ERU.

Upland Woodland. The 100-year projection for Alternative 6 indicated that the frequency of subbasins having areas of the upland woodland community at levels within its historical mid-range would increase 62 percent (table 2.40). However,

those subbasins having a substantial component of the upland woodland community would still be dominated by class 5 departures. The increase in number of subbasins falling within the historical range would predominantly be due to areal increases of the upland woodland community within subbasins of the Central Idaho Mountains and Upper Klamath ERUs. In addition, areal declines of upland woodland in the Owyhee Uplands and Blue Mountains ERUs would contribute to an increased frequency of class 3 subbasins.

Alternative 7 Departures

Alternative 7 would decrease the average frequency of subbasin memberships in classes 1 and 5 departures to 25 and 23 percent, respectively. Similarly, the average frequency of communities within class 3 departures would increase to 41 percent (table 2.38).

The 100-year projection for Alternative 7 indicated that the mid-seral lower montane forest and upland woodland communities would differ the most, in a positive direction, from historical conditions; at least 52 percent of the subbasins would contain these communities at levels well above their historical mid-ranges. Also, the upland herbland and upland shrubland communities would differ the most in a negative direction; at least 56 percent of the subbasins would contain areas of these communities at levels well below their historical mid-ranges (tables 2.39 and 2.40).

Montane Community Departures in Alternative 7 —

Early-seral Lower Montane Forest. The 100-year projection for Alternative 7 indicated that the availability of the early-seral lower montane forest community would increase substantially from the current conditions. The number of subbasins containing areas of this community within its historical mid-range would increase by over 1,000 percent (table 2.39). This increase would largely occur throughout the Northern Glaciated Mountains, Lower Clark Fork, Central Idaho Mountains, Blue Mountains, Southern Cascades, and Columbia Plateau ERUs.

Mid-seral Lower Montane Forest. The 100-year projection for Alternative 7 indicated that virtually all subbasins within the Basin would contain areas of the mid-seral lower montane forest community at levels well above its historical mid-range (table 2.39). The areal extent of the mid-seral lower montane forest community would dramatically increase across much of the forested areas of the Upper Columbia River Basin, as well as within the Upper Klamath ERU and areas of the Eastside EIS area adjacent to the Upper Klamath ERU.

Late-seral Lower Montane Forest. Alternative 7 would substantially increase the areal extent of the late-seral lower montane forest community above the current conditions. The number of subbasins having levels of this community within its historical mid-range would increase by over 400 percent (table 2.39). This increase would occur predominantly within the Northern Cascades, Columbia Plateau, Blue Mountains, Northern Glaciated Mountains, Upper Clark Fork, and Central Idaho Mountains ERUs.

Early-seral Montane Forest. Alternative 7 would increase the number of subbasins having areas of the early-seral montane forest community within its historical mid-range by 89 percent (table 2.39). However, the increasing trend would be spatially variable across the Basin. Alternative 7 would result in a substantial increase of early-seral montane forests within many subbasins of the Northern Glaciated Mountains, Lower Clark Fork, Upper Clark Fork, Upper Klamath, Upper Snake, and Snake Headwaters ERUs, whereas there would be a substantial decrease within the Blue Mountains and Central Idaho Mountains ERUs (table 2.39). Additionally, the early-seral montane forest community would decrease substantially throughout the northern half of the Northern Cascades ERU, but increase substantially within its southern half.

Mid-seral Montane Forest. The 100-year projection for Alternative 7 indicated that the number of subbasins having the mid-seral montane forest community within its historical mid-range would increase by 142 percent (table 2.39). This increase would predominantly be due to increases in mid-seral forests throughout the Central Idaho Mountains and Upper Klamath ERUs. Conversely, we projected areal declines of this community throughout many subbasins within the Northern Glaciated Mountains and Lower Clark Fork ERUs.

Late-seral Montane Forest. Alternative 7 would increase the number of subbasins having the late-seral montane forest community within its historical mid-range by 433 percent, relative to the current period (table 2.39). This increase would largely be attributed to increases in late-seral montane forests throughout the Northern Glaciated Mountains, Lower Clark Fork, Upper Clark Fork, Central Idaho Mountains, and Snake Headwaters ERUs. Areal declines of the late-seral montane forest community within the Southern Cascades ERU would also increase the frequency of subbasins having this community within its historical mid-range. The Northern Cascades, Blue Mountains, and Columbia Plateau ERUs would contain some subbasins with areal increases and others with areal declines, which would increase the frequency of subbasins having the late-seral montane forest community within its historical mid-range.

Subalpine Community Departures in Alternative 7 —

Early-seral Subalpine Forest. The 100-year projection for Alternative 7 indicated that the number of subbasins having the early-seral subalpine forest community within its historical mid-range would increase by 230 percent (table 2.39). This increase would predominantly be due to decreases in early-seral forests throughout the Northern Cascades, Lower Clark Fork, Snake Headwaters, and Central Idaho Mountains ERUs. Expected increases in the early-seral subalpine community within the Northern Glaciated Mountains ERU would also increase the frequency of subbasins having this community within its historical mid-range.

Mid-seral Subalpine Forest. The frequency of subbasins having the mid-seral subalpine forest community within its historical mid-range increased by 200 percent for the 100-year projection of Alternative 7 (table 2.39). This increase would predominantly be due to increases in mid-seral subalpine forests throughout the Southern Cascades, Blue Mountains, and Central Idaho Mountains ERUs, and to a lesser extent, the Snake Headwaters ERU. Expected areal declines of this community in several subbasins of the Lower Clark Fork, Upper Clark Fork, and Snake Headwaters ERUs would also increase the proportion of subbasins having an areal extent of this community within its historical mid-range.

Late-seral Subalpine Forest. The frequency of subbasins having the mid-seral subalpine forest community within its historical mid-range increased 292 percent for the 100-year projection of Alternative 7 (table 2.39). This increase would predominantly be due to areal increases of the late-seral subalpine forest community throughout the Northern Cascades, Northern Glaciated Mountains, Lower Clark Fork, Upper Clark Fork, Central Idaho Mountains, and Snake Headwaters ERUs.

Upland Community Departures in Alternative 7 —

Upland Herbland. The 100-year projection for Alternative 7 indicated that the frequency of subbasins having the upland herbland community within its historical mid-range would increase by 208 percent (table 2.40). This increase would largely be due to areal increases of upland herbland within the Northern Great Basin, Owyhee Uplands, Central Idaho Mountains ERUs, and the most northern extension of the Blue Mountains ERU. These changes are substantially different from those observed in other alternatives.

Upland Shrubland. The 100-year projection for Alternative 7 did not substantially change the proportion of subbasins that would have the upland herbland community at levels within its historical mid-range (table 2.40). However, the spatial distribution of class 3 subbasins would change substantially. We observed a decline of class 3 subbasins in the western portion of the Northern Great Basin ERU and across some of the Owyhee Uplands ERU, but an increase of class 3 subbasins within the Central Idaho Mountains ERU.

Upland Woodland. Alternative 7 would increase the frequency of subbasins containing areas of the upland woodland community within its historical mid-range by 115 percent (table 2.40). However, those subbasins having a substantial component of the upland woodland community would still be dominated by class 5 departures. The increased number of subbasins falling within the historical mid-range would predominantly be due to areal increases of the upland woodland community in subbasins within the Central Idaho Mountains ERU. In addition, areal declines of upland woodland in the Columbia Plateau and Owyhee Uplands ERUs would also contribute to an increased frequency of class 3 subbasins.

Discussion on Departures of the Alternatives

For most alternatives, a major shift was projected in the frequency distribution of departure classes between the current and 100-year periods, from a class 1 to a class 5 departure or vice versa. This wide fluctuation occurred with the community groups that commonly composed very low proportions of the subbasins. Therefore, when the historical range of a community was relatively small, only minor changes of areal extent were required to cause rather large fluctuations of departure classes.

Even with the major shift in departure classes between the current and 100-year periods, overall there were relatively minor differences between the seven alternative projections in subbasin departure frequency reported at the Basin scale (tables 2.39 and 2.40). However, there are substantial differences between alternatives in the spatial distribution of terrestrial community groups and their associated departures. Spatial arrangement of communities and associated disturbances are discussed in greater detail in the "Vegetation Response and Disturbance Patterns" and "Summary and Synthesis" sections later in this chapter.

With few exceptions, most alternatives are expected to increase the frequency of subbasins having most community groups within their historical mid-range, which is class 3 departure (tables 2.39 and 2.40). Two communities, the lower montane mid-seral forest and the upland shrubland, were exceptions. The frequency of subbasins having the lower montane mid-seral forest community within its historical mid-range remained about the same, or decreased in Alternatives 1, 2, 3, and 5 as did the number of subbasins having the upland shrubland community for all alternative projections.

However, rarely did any alternative projection indicate more than a 50 percent increase in the proportion of subbasins in which any community occurred within its historical mid-range (tables 2.39 and 2.40). Overall, Alternative 7 would have the greatest average frequency of subbasins containing the 12 terrestrial community groups within their historical mid-ranges (table 2.38).

Departure Discussion by Community

Montane Departures

<u>Early-Seral Lower Montane Forest</u> — All alternatives would decrease the number of subbasins having areas of the early-seral lower montane community group at levels well below its historical mid-range, constituting a class 1 departure. Conversely, all alternatives would substantially increase the frequency of subbasins having this community within its historical mid-range. Although this increase would be ten-fold, none of the alternatives were projected to have more than 50 percent of the subbasins in this community within its historical mid-range.

Mid-Seral Lower Montane Forest — All alternatives would decrease the frequency of subbasins having the mid-seral lower montane community at levels well below its historical mid-range, constituting a class 1 departure. However, all alternatives would increase the frequency of subbasins having areas of this community well above its historical mid-range. None of the alternatives would substantially change the frequency of subbasins having this community within its historical mid-range; rather, the alternatives would merely change the sign of the departures, from being below to being above the historical mid-range of conditions.

Late-Seral Lower Montane Forest — All alternatives would decrease the number of subbasins having the late-seral lower montane community at levels well below its historical mid-range, constituting a class 1 departure. Conversely, all alternatives would substantially increase the frequency of subbasins having this community within its historical mid-range. Although all alternatives would increase the frequency of subbasins having this community within its historical mid-range by nearly five-fold, no alternative would result in more than 40 percent of the subbasins having the late-seral lower montane community within its historical mid-range.

Early-Seral Montane Forest — The frequency of subbasins having the early-seral montane forest community at a level within its historical mid-range would increase under all alternatives. However, no alternative was expected to have more than 34 percent of their subbasins with this community within its historical mid-range.

Mid-Seral Montane Forest — All alternatives would increase the frequency of subbasins having the areal extent of the mid-seral montane forest community within its historical mid-range. However, the frequency of subbasins having this community within its historical range would not exceed 46 percent under any alternative. All alternatives would substantially decrease the frequency of subbasins having this community well below its historical mid-range. To a lesser degree, all alternatives would also decrease the frequency of subbasins having this community well above its historical mid-range.

Late-seral Montane Forest — All alternatives would result in at least a four-fold increase in the frequency of subbasins having the late-seral montane forest community at a level within its historical mid-range. However, less than 50 percent of the subbasins would contain areal extents of this community within its historical mid-range as a result of implementing any alternative. All alternatives would substantially decrease the frequency of subbasins having this community well below its historical mid-range; to a lesser degree, all alternatives would also decrease such frequency well above its historical mid-range.

Subalpine Departures

Early-seral Subalpine Forest — All alternatives, except Alternatives 3 and 4, would result in nearly a two-fold increase in the frequency of subbasins having an areal extent of the early-seral subalpine forest community within its historical mid-range. However, only Alternatives 1, 2, and 7 would result in more than 50 percent of the subbasins having the area of this community within its historical mid-range. All alternatives would substantially decrease the frequency of subbasins having this community well below its historical mid-range. Similarly, Alternatives 1, 2, and 7, and to a lesser degree Alternatives 5 and 6, would substantially decrease the frequency of subbasins having this community well above its historical mid-range.

Mid-seral Subalpine Forest — All alternatives would result in at least a two-fold increase in the frequency of subbasins having an areal extent of the mid-seral subalpine forest community within its historical mid-range. However, only in Alternatives 1 and 7 would more than 50 percent of the subbasins have this community within its historical mid-range. All alternatives would substantially decrease the frequency of subbasins having this community well above its historical mid-range. Similarly, Alternatives 1, 2, and 7, and to

a lesser degree Alternatives 3 through 6, would substantially decrease the frequency of subbasins having this community well below its historical mid-range.

Late-seral Subalpine Forest — All alternatives would result in nearly a four-fold increase in the frequency of subbasins having an areal extent of the late-seral subalpine forest community within its historical mid-range. However, only Alternatives 1, 2, and 7 would result in more than 50 percent of the subbasins having this community within its historical mid-range. All alternatives would substantially decrease the frequency of subbasins having this community well below its historical mid-range.

Similarly, Alternatives 1 and 3 through 6, and to a lesser degree Alternative 2, would substantially decrease the frequency of subbasins having this community well above its historical mid-range. Conversely, Alternative 7 would increase the frequency of subbasins having the late-seral subalpine forest well above its historical mid-range.

Upland Departures

Upland Herbland — All alternatives would result in nearly a two- to three-fold increase in the frequency of subbasins having extents of the upland herbland community within its historical mid-range. However, no alternative would result in more than 37 percent of the subbasins having the area of this community within its historical mid-range. Although all alternatives would decrease the frequency of subbasins having this community well below its historical mid-range, and constituting a class 1 departure, these subbasins would still dominate the Basin.

Upland Shrubland — None of the alternatives would substantially change the frequency of subbasins having the areal extent of the upland shrubland community within its historical mid-range. In fact, Alternatives 2 through 5 would actually decrease the proportion of subbasins having this community within its historical mid-range. All alternatives would substantially increase the proportion of subbasins having the upland shrubland community well below its historical mid-range. For all alternatives, the upland shrubland community departure class 5 would dominate the Basin.

Upland Woodland — Alternatives 1, 2, 6, and 7 would substantially increase the proportion of subbasins having the areal extent of the upland woodland community within its historical mid-range. However, no alternative would result in more than 28 percent of the subbasins having the area of this community within its historical mid-range. All alternatives would substantially increase the proportion of subbasins having the upland woodland community well above its historical range. For all alternatives, the upland woodland community departure class 5 would dominate the Basin.

Currently, nearly one-third of the subbasins having a substantial area of the upland woodland community type contain this community at a level well below its historical mid-range. Since all of these subbasins are most closely associated with forest environments, the apparent decline of the upland woodland community is most likely attributed to woodlands converting into forests. For example, mixed-conifer woodlands develop an adequate stocking level of trees to be classified as forest types.

Nine of the subbasins having at least a one percent upland woodland component had previously been classified as the "juniper woodland theme" (Quigley and others 1996). These nine subbasins are dominated by a western juniper component well above the historical mid-range. Alternatives 1, 2, and 7 would substantially increase the proportion of subbasins having juniper woodlands within its historical mid-range, to four out of nine. To a lesser degree, Alternatives 3 through 6 would also increase the proportion of subbasins having juniper woodlands within its historical mid-range, to two out of nine. However, Alternatives 3 through 6 would also increase the proportion of these subbasins having the juniper component below its historical mid-range, to three out of nine.

Summary of Terrestrial Community Departures

We observed a major shift in the frequency distribution of departure classes between the current period and the 100-year projections of most terrestrial community types for most alternatives. With few exceptions, most alternatives would increase the frequency of subbasins having the areal extents of most terrestrial community types within their historical mid-ranges.

While we detected relatively minor differences overall among the subbasin frequency distributions of habitat departures, we did detect substantial spatial differences of subbasin habitat departures among the seven alternatives.

With one exception (100-year projection of the early-seral montane forest community under Alternative 2), regardless of alternative, *the Basin would be dominated by subbasins having the areal extents of the early-seral montane forest, upland herbland, and upland shrubland communities below their historical mid-ranges.* Consequently, none of the alternatives would reduce the risks to persistence for those plant and animal taxa whose fitness is strongly dependent upon the areal extents of these coarse-scale community types.

Relative to the historical period, none of the alternatives would be effective in reducing the apparent over-abundance of the mid-seral lower montane forest, mid-seral montane forest, and upland woodland community types. Therefore, Basin-wide, we would expect a low risk to persistence for taxa whose fitness is closely associated with the areal extents of these coarse-scale communities.

We feel the errors in mapping the management prescriptions in Alternatives 2 and 7 discussed earlier in this section do not result in significant inaccuracies in this departure analysis. The community groups selected and the analytical techniques should substantially dampen the effects of these errors.

We would recommend that any future analysis of broad-scale communities as terrestrial habitats use the physiognomic type groups stratified by potential vegetation group (PVG) or, for a coarser grouping, by forest and rangeland. The changing nature of lower montane, montane, subalpine and non-forest terrestrial communities in relation to existing vegetation cover types with no tie to the biophysical environment is a substantial hindrance to this analysis. Without the tie to the biophysical environment little inference can be made relative to temperature, moisture, soils, terrain, or consistency of the terrestrial communities with the biophysical system and inherent succession and disturbance processes.

Vegetation Response and Disturbance Patterns

The response of vegetation to the different alternatives is discussed in reference to the terrestrial communities (TC), physiognomic type groups (PTG), potential vegetation groups (PVG), and transition of physiognomic type group by PVG. Figures for the key terrestrial community discussion are included in the text. Figures for transitions and PTG by PVG are provided in appendices 2J and 2K, respectively. For information on definitions and cross-walk relationships of terrestrial communities, we refer the reader to the Landscape Dynamics assessment (Hann and others, in press), appendices 3A-3G.

Successional changes for the potential vegetation groups are generally discussed in reference to transitions of the physiognomic types, which are highly correlated with the terrestrial communities. Spatial differences among alternatives are described using forest and range cluster groups (map 2.22) and Ecological Reporting Units (ERUs) (map 2.24). Additional information about physiognomic types is provided in this chapter in the discussion about management and other disturbances.

We are fairly confident about the predicted response at the EIS area, potential vegetation group, ecological reporting unit, and forest and range cluster group levels. However, the subbasin (map 2.22) predictions should be used with caution, since the simulated prescriptions were not mapped at the subbasin/potential vegetation group level, but instead at the forest or range cluster group and potential vegetation group levels.

Forest Potential Vegetation Groups

The forest potential vegetation groups include the dry forest, moist forest, and cold forest.

In the Eastside EIS area, there are approximately 10.7 million hectares (26.4 million acres) of the forest potential vegetation groups on BLM- and FS-administered lands:

- 5.9 million hectares (14.6 million acres), or 55 percent, in dry forest
- 3.6 million hectares (8.9 million acres), or 34 percent, in moist forest
- 1.2 million hectares (3 million acres), or 11 percent, in cold forest.

In the Upper Columbia River Basin EIS area, there are approximately 10.2 million hectares (26.2 million acres) of the forest potential vegetation groups on BLM- and FS-administered lands:

- 2.4 million hectares (5.9 million acres), or 23 percent, in dry forest
- 4.7 million hectares (11.6 million acres), or 47 percent, in moist forest
- 3.1 million hectares (7.7 million acres), or 30 percent, in cold forest.

The historical to current comparisons depict transitions of different physiognomic types from the circa 1850s historical map to the current map. For each alternative, the depicted transition is from current to the 100-year map (appendix 2J).

There were errors in the management prescription (Rx) mapping for Alternatives 2 and 7 that resulted in problems with simulation of response. The amount of exotic herbland projected in Alternative 2 was too high and was adjusted to be similar to Alternative 1. The first iteration of Rx mapping did not reflect the activity levels in the preliminary draft EIS Chapter 3 or the standards. The actual response would be intermediate between the depicted Alternative 7 response and the Alternative 3 response. This was corrected in the section, "Evaluation of Landscape Disturbances," on disturbance and management activities and in the appendices on transition (2J) and PTG by PVG response (2K), but there was inadequate time to correct the terrestrial community response.

Lower Montane Forest Response

Early-Seral Lower Montane Forest — Occurrence: Although most terrestrial communities of this type are in the dry forest, some can occur in the moist forest. Early-seral lower montane currently occurs below historical levels in both EIS areas, which was a finding of concern in the landscape assessment (Hann and others, in press)(figs. 2.49 and 2.50).

Response to Alternatives: Figures 2.49 and 2.50 depict the response of the early-seral lower montane forest terrestrial communities. All alternatives would increase the amount of this terrestrial community as a result of ponderosa pine regeneration following harvest, prescribed fire, and wildfire. Alternatives 3 through 6, which emphasize restoration, would provide for the most increase; Alternative 1 would have an intermediate increase; Alternative 2 would have the lowest increase; and Alternative 7 if corrected would be somewhat above that of Alternative 2.

The primary disturbances that would produce the early-seral lower montane are:

- Alternative 1: harvest and wildfire.
- Alternative 2 and 7: wildfire.
- Alternatives 3 through 6: harvest and prescribed fire.

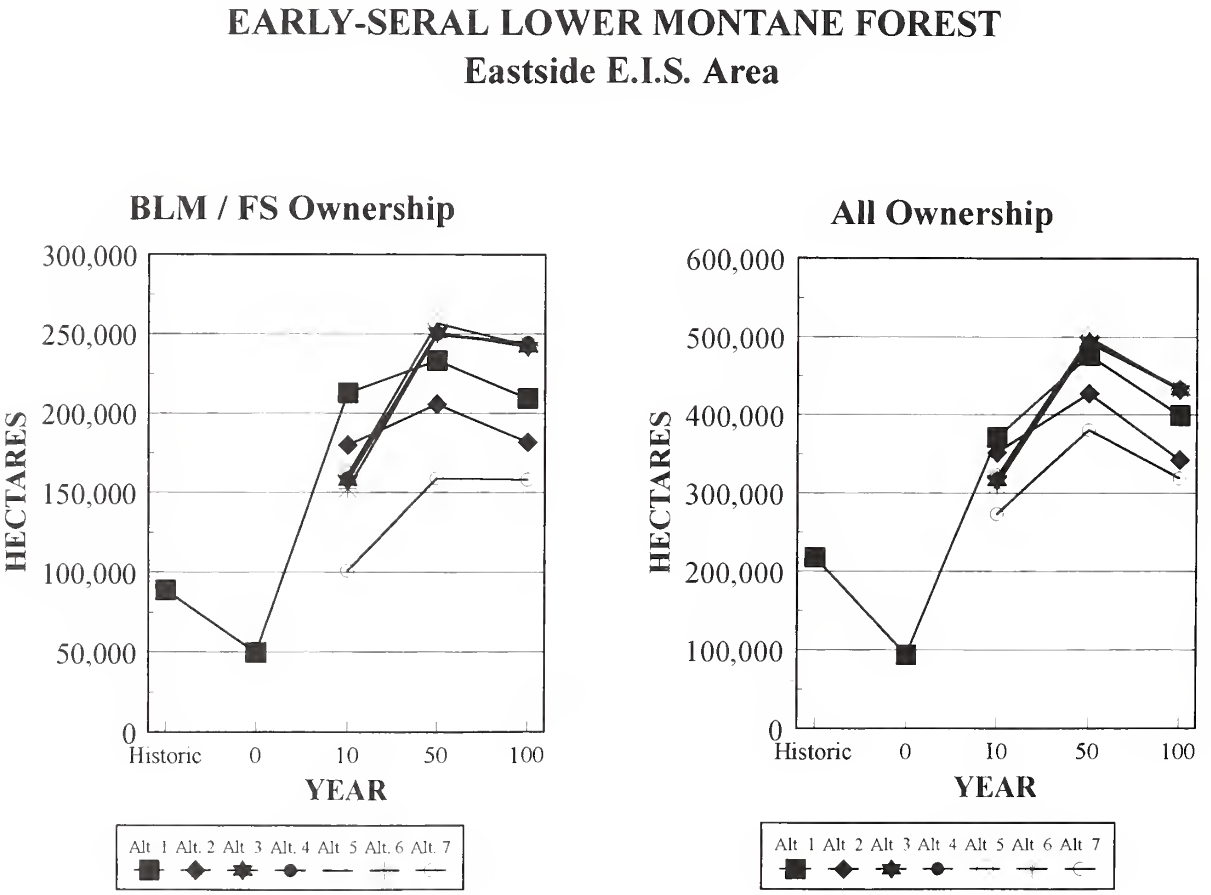


Figure 2.49 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the early-seral lower montane forest for the Eastside EIS area.

EARLY-SERAL LOWER MONTANE FOREST
Upper Columbia E.I.S. Area

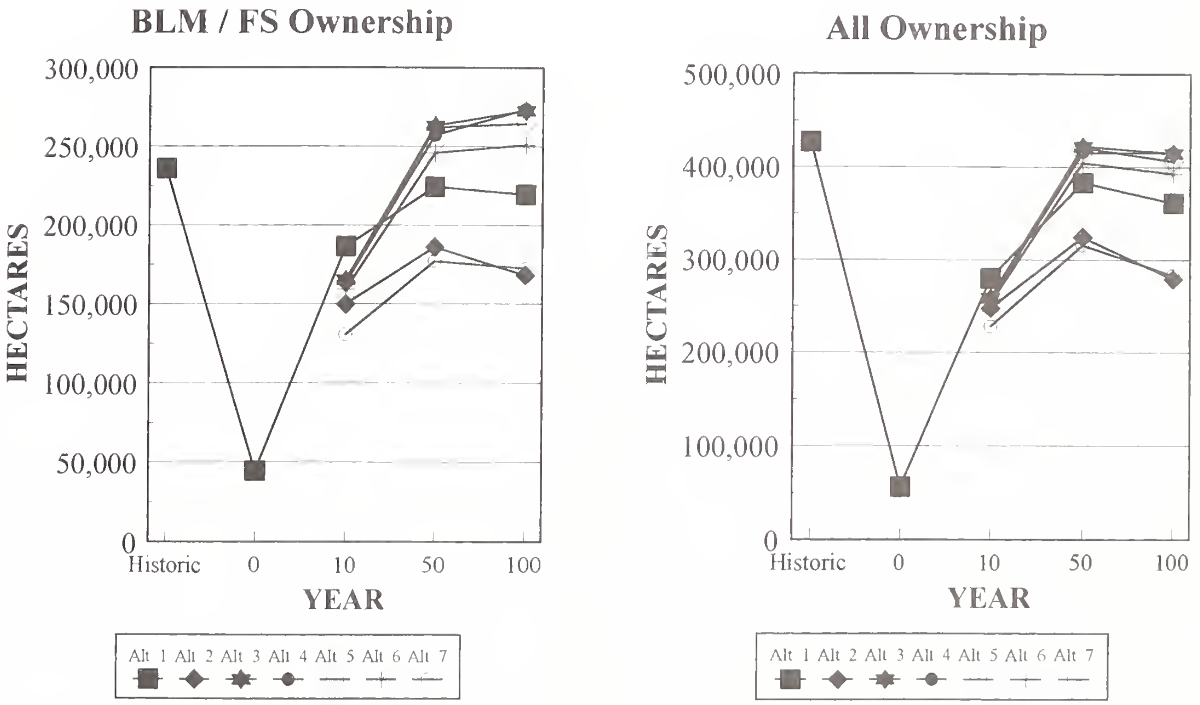


Figure 2.50 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the early-seral lower montane forest for the Upper Columbia River Basin EIS area.

Community Transition: There was little early-seral lower montane created from the historical to current, except by succession from upland herb. Although a small amount was created through harvest in late-seral forests, the patch sizes were small and the cutting treatments often maintained an overstory but did not provide for regeneration of shade-intolerant species, including ponderosa pine.

In all alternatives, the projected early-seral lower montane would come primarily from the late-seral, shade-tolerant, multi-layer forest. The model simulations indicate that herb and shrub types would continue to decline in the dry forest potential vegetation group in all alternatives. We note a lack of emphasis in any alternative on management to control exotic plants and noxious weeds in the dry forest potential vegetation group, whereas considerable emphasis would be placed on exotic plant and noxious weed control in the rangeland potential vegetation groups.

Composition and Structure: The structure of the early-seral communities would be closest to the native composition and structure in Alternatives 4 and 6, which have harvest and fire treatments that emphasize mimicking of ecosystem processes. Alternative 1 would produce early-seral communities similar to tree regeneration plantations, with

uniform spacing and size. Alternative 2 would be predominated by areas with small harvest patches, or areas of wildfire that would be salvage-logged and planted. Depending on the local priority and degree of ecological emphasis, Alternative 3 would produce structures having moderate similarity to the native regime. Alternative 5 would be similar to Alternative 1 in the higher production areas, and to Alternative 3 in other areas. Alternative 7 would have structures similar to Alternative 3 in the non-reserve areas and to wildfire-created structures in the reserve areas.

Fire, Disturbances and Treatment: The current early-seral that was created in the dry forest is typically in the wrong location for the fire regime. Historically, this type occurred on the steeper landforms where climate and topography supported either a relatively frequent fire interval that maintained upland herbland, shrubland, and early-seral communities, or a less frequent crown-fire regime that cycled mid-seral communities. Harvesting patterns have typically created these types on benches and ridges that historically were in a relatively frequent underburning regime, which maintained open (park-like) late-seral single-layer structures.

Harvest units and prescribed fires in Alternatives 1 and 2 would continue the same harvest pattern as current management. Wildfire in Alternative 2 would tend to create early-seral patches consistent with the current fuel patterns. Harvest units and prescribed fires in Alternatives 4 and 6 would result in patterns similar to the native regime, with Alternative 6 transitioning at a slower rate. Alternative 5 would generally not emphasize restoring landscape patterns in this type. Alternative 3 would proceed at a very slow rate given its local emphasis. Alternative 7 would be similar to Alternative 3 in the non-reserve areas, and to wildfire-created mosaics in the reserve areas.

Spatial Distribution of Activities: In Alternatives 1 and 2, disturbances and treatments that create this type would generally be scattered throughout all the forest and range cluster groups (see table 2.20, map 2.22). In Alternatives 4 and 6, the prescribed natural fire program (both planned and unplanned ignition) would play a primary role by having: some associated harvest treatments in forest and range cluster group H; timber harvest with fuel treatments to reduce risk of wildfire prioritized in group F; a moderate emphasis on fuel and harvest treatments in groups J and L; and low emphasis in group M. The focus of Alternative 3 for harvest and fuel treatments would be in groups J and L. Although Alternative 5 would not focus treatments on early-seral lower montane, this type would be created primarily in groups L and M.

<u>**Mid-Seral Lower Montane Forest**</u> —

Occurrence: Most of this terrestrial community is in the dry forest, but some can occur in the moist forest. Although its current and historical levels are about the same in the Eastside EIS area within BLM- and FS-administered lands, its current level in the Upper Columbia River Basin EIS area and for All ownerships combined in both EIS areas is much higher than historical levels (figs. 2.51 and 2.52).

Response to Alternatives: Figures 2.51 and 2.52 depict the response of the mid-seral lower montane forest. Alternatives 1 and 2 would show a strong increase in the amount of mid-seral lower montane, primarily due to management on BLM- and FS-administered lands, but partially due to comparable management on other lands. The restoration-emphasis alternatives (3 through 6) generally would maintain amounts of mid-seral lower montane at its historical and current levels as a result of harvest, thinning, and prescribed fire, along with the associated effects of wildfire. Alternative 7 would be similar to the figure response in the reserve areas, and to Alternative 3 on the non-reserve areas.

Community Transition: From the historical to current period, this type primarily changed from upland herbland and shrubland communities, and early-seral and single-layer, late-seral intolerant (primarily lower montane) forests. The net change to a mid-seral community resulted from succession in response to fire exclusion. Although some mid-seral developed in the native regime, it generally cycled to early-seral stages with fire.

MID-SERAL LOWER MONTANE FOREST
Eastside E.I.S. Area

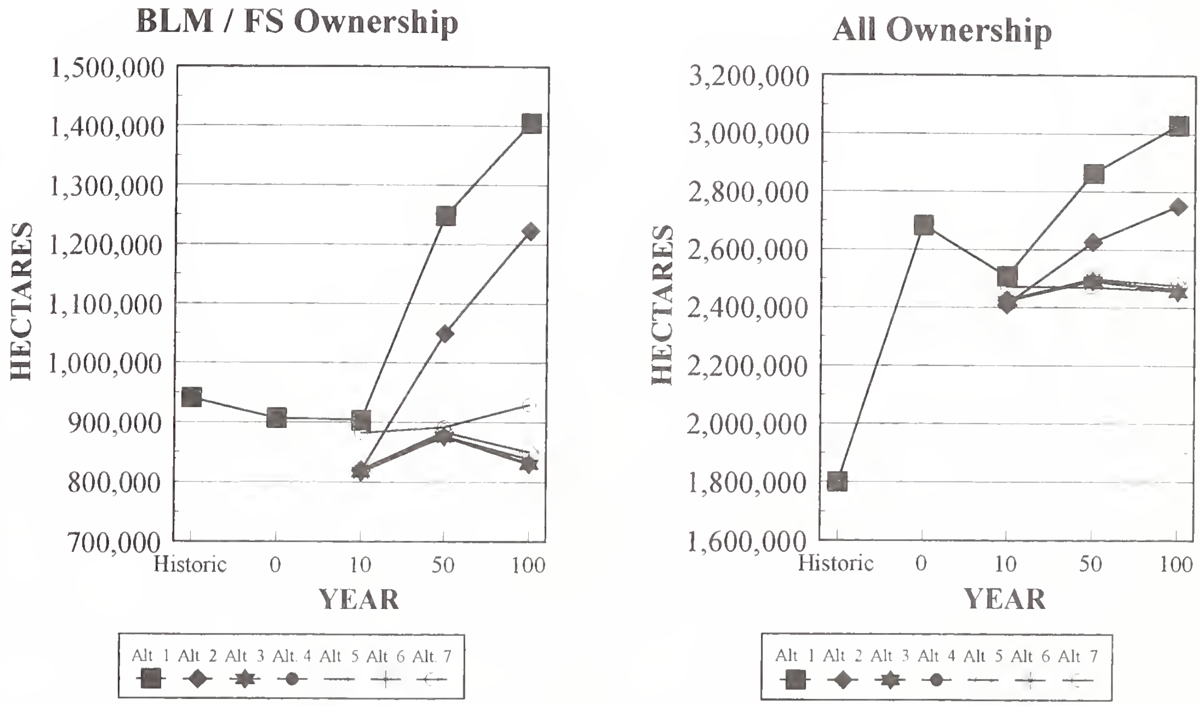


Figure 2.51 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the mid-seral lower montane forest for the Eastside EIS area.

The transition from late-seral single-layer forests to mid-seral involves loss of the overstory from stress, insect, and disease mortality. These disturbances are associated with a lack of understory and mixed-behavior type fires in the late-seral stage. Without mixed behavior fires that create a thinning effect and accelerate growth of survivor trees, much of the mid-seral stage also stays in the mid-seral stage.

Alternatives 1 and 2 would continue the transition of upland herb, early-seral forest, and late-seral forest to mid-seral forest, and maintain much of the mid-seral forest in the mid-seral stage. The transitions from mid-seral in Alternatives 1 and 2 cycle within the mid-seral stage, or to late-seral multi-layer stages. This change in pattern is associated with high mortality of large and intermediate size trees from stress, insects, disease, and wildfire, along with the associated effects of salvage logging.

Alternatives 3 through 6 would have much lower levels of net transitions to the mid-seral stage and generally to the late-seral single-layer community. Alternative 7 would be similar to the figure response in the reserve areas, and to Alternative 3 in the non-reserve areas. Alternatives 3 through 6 would generally maintain amounts similar to the HRV on BLM- and FS-administered lands in the Eastside EIS area.

MID-SERAL LOWER MONTANE FOREST
Upper Columbia E.I.S. Area

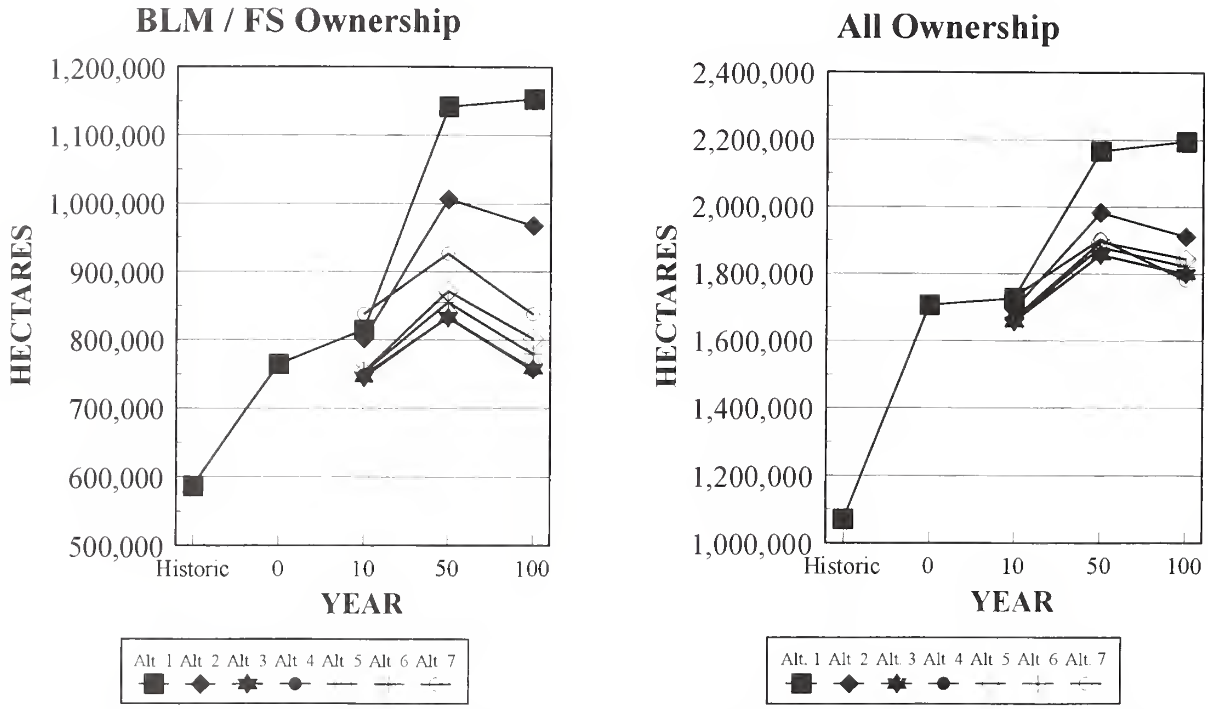


Figure 2.52 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the mid-seral lower montane forest for the Upper Columbia River Basin EIS area.

Across all ownerships in the Eastside EIS area, the level of mid-seral lower montane maintained would be much higher due to the general pattern of harvesting of the larger trees and leaving of small trees. In the Upper Columbia River Basin area, however, the amount of mid-seral lower montane maintained on BLM- and FS-administered lands in Alternatives 3 through 6 would be similar to current levels, which are substantially above the HRV.

Composition and Structure: In general, the structure of these early-seral communities would be closest to the native regime in Alternatives 4 and 6 due to their emphasis on mimicking ecosystem processes with harvest and prescribed fire treatments. Alternative 1 would produce mid-seral communities with relatively uniform spacing and size. Alternative 2 would produce stands of high density and small, dead-standing and down trees. Depending on local priorities and the degree of ecological emphasis, Alternative 3 would produce structures having moderate similarity to the native regime. Alternative 5 would be similar to Alternative 1 in the higher production areas, and similar to Alternative 3 in other areas. Alternative 7 would produce structures similar to Alternative 3 in the non-reserve areas, and to current structures in the reserve areas.

Fire, Disturbances, and Treatments: The current mid-seral stage in the dry forest is typically found in all fire regimes of the dry forest. This type occurred historically on the steeper landforms where climate and topography provided a crown fire regime that cycled mid-seral communities to early-seral communities and accelerated some patches into late-seral single-layer communities. The native fire regime in these areas included relatively frequent underburning fires that maintained open (park-like) late-seral single-layer structures. Historical harvest patterns, that removed large older trees in combination with fire exclusion, accelerated development of these mid-seral types on benches and ridges.

Continuing the traditional harvest and fire exclusion in Alternatives 1 and 2 would increase the amount of mid-seral that is inconsistent with the succession/disturbance regime. The thinning, harvest units, and prescribed fires in Alternatives 4 and 6 would shift patterns to the native regime, with Alternative 6 transitioning at a slower rate. Alternative 5, given its economic priority limitations, would have moderate ability to shift patterns to fit the native regime. Alternative 3 activities would be implemented at varying rates due to local emphasis. Alternative 7 would be similar to Alternative 3 in the non-reserve areas, and to the current regime in the reserve areas.

Spatial Distribution of Activities: In Alternatives 1 and 2, disturbances and treatments that affect the mid-seral lower montane forest would generally be scattered throughout all subbasin groups. In Alternatives 4 and 6, the prescribed natural fire program (both planned and unplanned ignition) would play a primary role, with: some associated harvest, thinning, and prescribed fire treatments in subbasin group H; thinning, timber harvest, and fuel treatments to reduce wildfire risk prioritized in group F; moderate emphasis on thinning, harvest, and fuel treatments in groups J and L; and low emphasis in group M. In Alternative 3, the focus for these treatments would be in groups J and L. Alternative 5 would have some treatment focus on the mid-seral lower montane forest, but the treatments would be prioritized in groups L and M.

Late-seral Multi-layer Lower Montane Forest —

Occurrence: Although most of this terrestrial community is in the dry forest, some can occur in the moist forest. The current level in the Eastside EIS assessment area is about the same as the historical level on BLM- and FS-administered lands, but lower than historically on All ownerships. In the Upper Columbia River Basin EIS area, the current level of late-seral lower montane is substantially below historical levels within BLM- and FS-administered lands and for All ownerships (figs. 2.53 and 2.54).

Response to Alternatives: Figures 2.53 and 2.54 depict the response of the late-seral multi-layer lower montane forest. In Alternatives 1 and 2, there would be a strong increase in the amount of late-seral lower montane, primarily due to management on BLM- and FS-administered lands, but partially due to similar management on other lands. The restoration emphasis alternatives (3 through 6) would have less of an increase in the Upper Columbia River Basin EIS area; these alternatives would generally maintain the late-seral multi-layer lower montane at its historical and current levels on BLM- and FS-administered lands as a result of harvest, thinning, and prescribed fire, along with the associated affects of wildfire. Alternative 7 would be similar to the figure response in the reserve areas, and to Alternative 3 on the non-reserve areas. There would be a substantial increase in the late-seral multi-layer community on BLM- and FS-administered lands for Alternatives 1, 2, and 7; and across All ownerships for all alternatives.

The increasing trend of this community on All ownerships and in Alternatives 1, 2, and 7 on BLM- and FS-administered ownerships is related to: 1) succession of mid-seral communities to late-seral, 2) traditional harvest treatments, which remove larger commercial trees and leave live and dead standing trees of sufficiently large size to still classify as late-seral, and 3) fire exclusion. How-

ever, due to the loss of old trees, large snags, and diversity of structure and composition, this community does not qualify as old forest. The composition of these structures tends to shift markedly over time as species and individual trees of large size and sound wood are selectively harvested; this practice often results in the loss of genetic diversity. In many respects, these structures are very similar to the dense mid-seral structures discussed above. Their risk of mortality from stress, insects, and disease becomes very high, as does the associated risk of wildfire. Net productivity generally declines.

In modeling disturbance probabilities at this scale, we did not account for a higher wildfire or insect/disease disturbance potential for differences in conditions within the late-seral multi-layer community. Finer-scale modeling would have allowed separate classification of these structures, showing higher probabilities of mortality and fire disturbance that would have converted these structures to either mid- or early-seral.

Community Transition: From the historical to current period, this type primarily transitioned from the mid- or late-seral single-layer communities. Some of this community was present in the native regime on areas with infrequent crown fire regimes. Transition from late-seral single-layer to

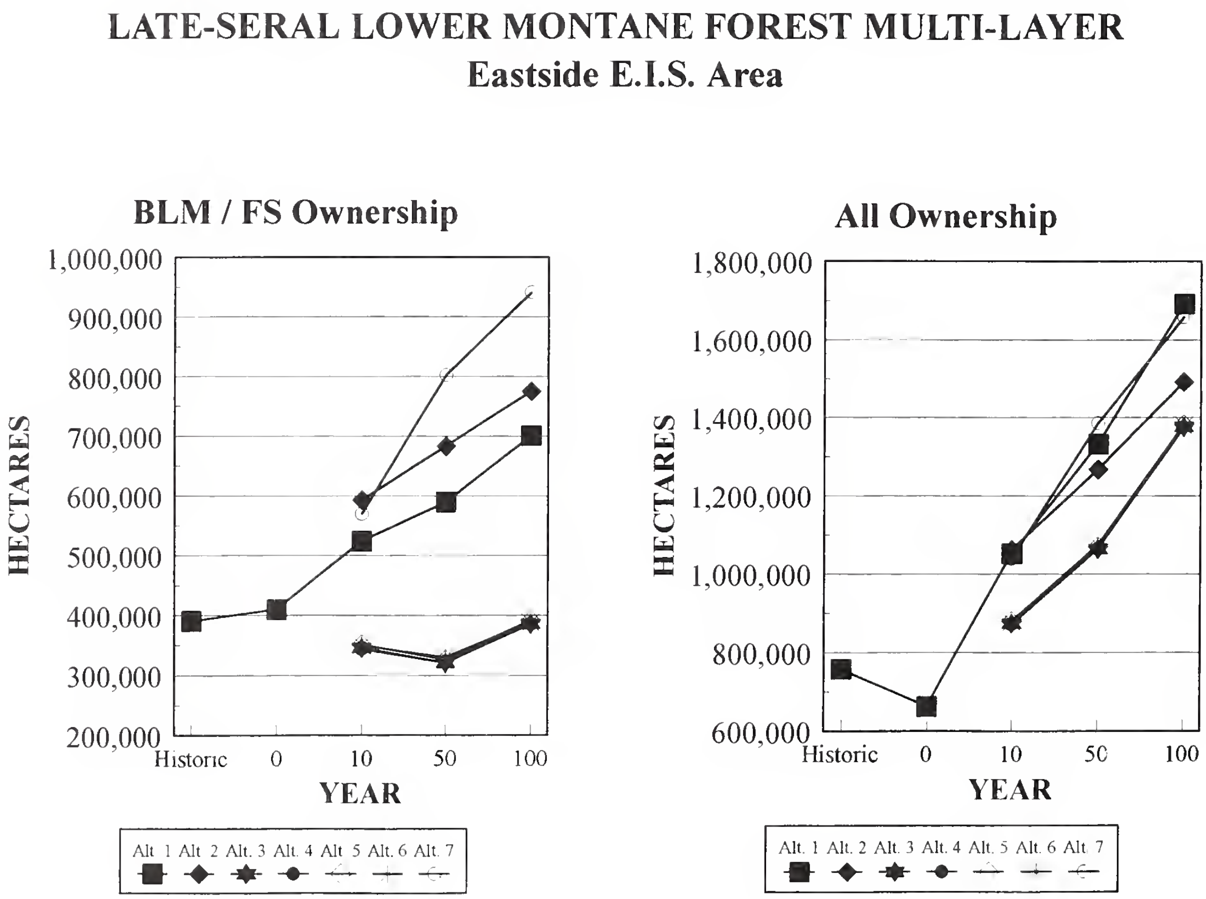


Figure 2.53 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the late-seral lower montane forest multi-layer for the Eastside EIS area.

multi-layer involves regeneration and growth of shade-tolerant species into the understory. This transition has typically been a response to fire exclusion in underburning regimes that support late-seral single-layer communities.

Development of these communities from mid-seral stages occurs when given enough time without a crown fire. In this transition, the native fire regime often had mixed type fires that accelerated the communities' development to late-seral multi-layer structures through their thinning effect; then, eventually, these late-seral were either converted to a single-layer by an underburn, or cycled to early-seral with a crown fire.

Alternatives 1 and 2 would continue the mid-seral forest's transition to this late-seral multi-layer stage. Alternatives 3 through 6 would have patterns of change similar to this type's native succession/disturbance regime, with much lower levels of net transitions to the late-seral multi-layer stage, but substantial increases in transitions to the late-seral single-layer community. Alternative 7 would have change patterns similar to Alternative 2 in the reserve areas, and to Alternative 3 in the non-reserve areas. Alternatives 3 through 6 generally would maintain an amount of this type on BLM- and FS-administered lands similar to the HRV. Across all ownerships, the level of the late-seral multi-layer lower montane forest would be much higher.

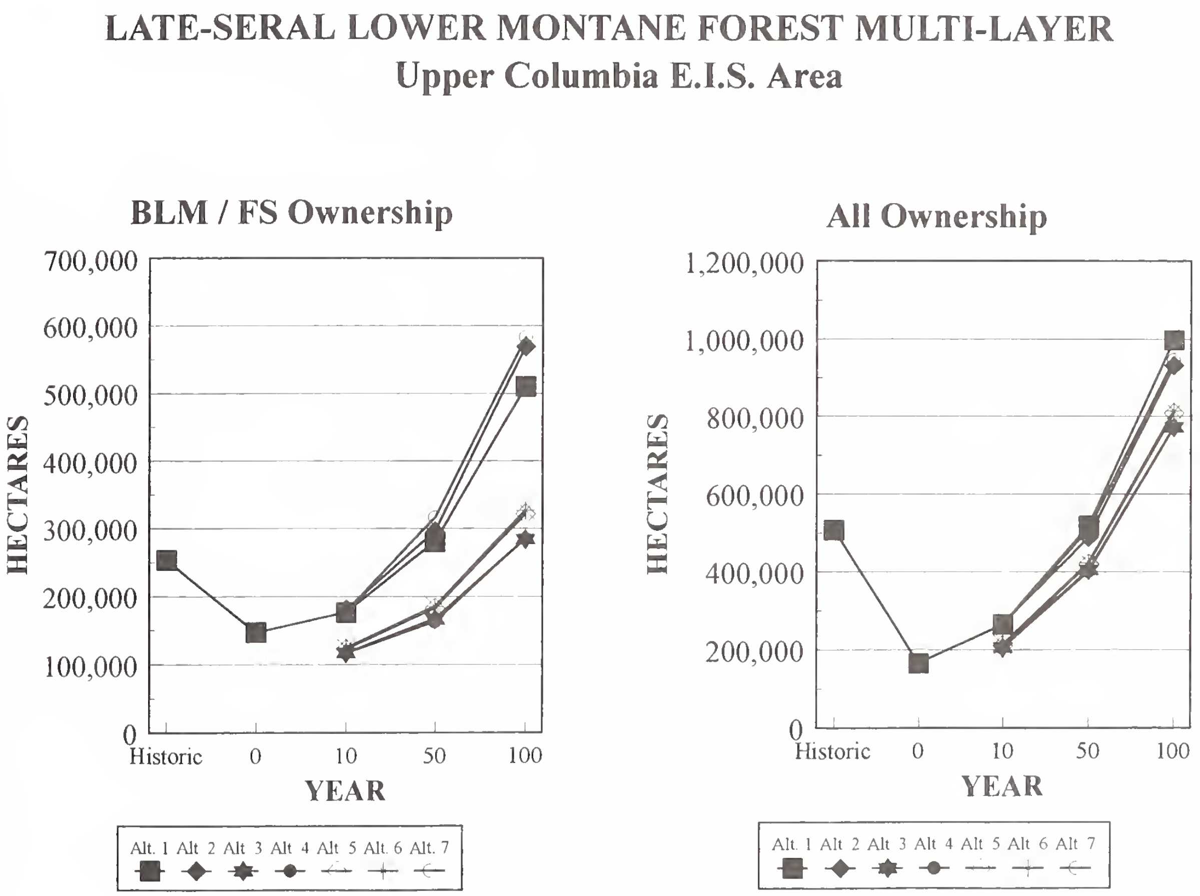


Figure 2.54 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the late-seral lower montane forest multi-layer for the Upper Columbia River Basin EIS area.

Composition and Structure: Although the structural stage class at this scale does not change, the effects on composition and structure are dramatically different from the native regime. In general, the structure of the late-seral multi-layer communities would be closest to the native composition and structure in Alternatives 4 and 6, due to their emphasis on mimicking ecosystem processes with harvest, thinning, and prescribed fire treatments. Alternatives 1 and 2 would tend to produce either very dense, multi-layer communities subject to high mortality as a result of fire exclusion, or communities affected by harvest including the removal of large, old trees and large snags. Depending on the local priorities and degree of ecological emphasis, Alternative 3 would produce structures having moderate similarity to the native regime. Alternative 5 would be similar to Alternative 1 in the higher production areas, and to Alternative 3 in other areas. Alternative 7 would have structures similar to Alternative 3 in the non-reserve areas, and to current structures in the reserve areas.

Fire, Disturbances, and Treatments: The current late-seral multi-layer community in the dry and moist forest is typically found in all fire regimes of the dry forest. Historically, this type occurred on the more moist landforms where climate and topography provided for a regime that allowed development of late-seral, multi-layer, shade-intolerant-dominated communities. These types ranged in patch size from small to large, depending on the geographic area, terrain, and climate.

The historical harvest patterns, involving selection of large older trees in combination with fire exclusion, resulted in development of multi-layer late-seral communities on steep dry slopes typically subject to a more frequent mixed or crown fire regime, and on benches and ridges historically subject to relatively-frequent underburning.

Continued traditional harvest and fire exclusion in Alternatives 1 and 2 would increase the amount of this structure that is inconsistent with the native succession/disturbance regime. Thinning, harvest units, and prescribed fires in Alternatives 4 and 6 would produce patterns similar to the native regime, except Alternative 6 would transition at a slower rate. Alternative 5 would have moderate ability to shift patterns, given its economic priority limitations; Alternative 3 would proceed at varying rates depending on local emphasis. Alternative 7 would be similar to Alternative 3 in the non-reserve areas, and would cycle these types with wildfire in the reserves.

Spatial Distribution of Activities: In Alternatives 1 and 2, disturbances and treatments that affect this type would generally be scattered throughout all subbasin groups. In Alternatives 4 and 6, the prescribed natural fire program (both planned and unplanned ignition) and limited associated harvest, thinning, and prescribed fire treatments would have emphasis in subbasin group H; thinning, timber harvest, and fuel treatments to reduce risk of wildfire prioritized in group F; moderate emphasis on thinning, harvest, and fuel treatments in groups J and L; and low emphasis in group M. In Alternative 3, the focus for thinning, harvest, and fuel treatments would be in groups J and L. In Alternative 5, there would be some focus on this type, but it would be prioritized in groups L and M.

Late-seral Single-layer Lower Montane Forest —

Occurrence: Most of this terrestrial community is in the dry forest, but some can occur in the moist forest. The current level is substantially lower than the historical level within BLM- and FS-administered lands, and for all ownerships (figs. 2.55 and 2.56). The decline of this type was an expressed concern in the landscape assessment (Hann and others, in press).

Response to Alternatives: Figures 2.55 and 2.56 depict the response of the late-seral single-layer lower montane forest. Alternatives 1 and 2 in the EEIS area would continue the decline of late-seral lower montane, essentially to the point of being non-existent in the Eastside EIS area within 50 years. The restoration emphasis alternatives (3 through 6) would increase the amount on BLM- and FS-administered lands to approximately 60

percent of its historical level with thinning and prescribed fire over the 100-year period. The historical level would be achievable, if the average decade's management activities for this type were increased by about 50 percent.

In the Upper Columbia River Basin EIS area, the amount of late-seral single-layer lower montane on BLM- and FS-administered lands would increase close to the historical level over the 100-year period through thinning and prescribed fire. For wilderness and semi-primitive areas where achieving projected levels of this type would be difficult, we assumed fairly active prescribed natural fire (planned and unplanned ignition). Alternative 7 would have a response similar to the figure in the reserve areas, and to Alternative 3 in the non-reserve areas.

Community Transition: From the historical to current period, there was no net transition to the late-seral single-layer type, but rather a high transition from this type to mid- and late-seral multilayer stages. Historically, there was a high component of this community, mostly on areas subject to frequent underburning that generally occurred on bench and ridge type landforms where the climate, ignition frequencies, and fire behavior maintained open (park-like) stands.

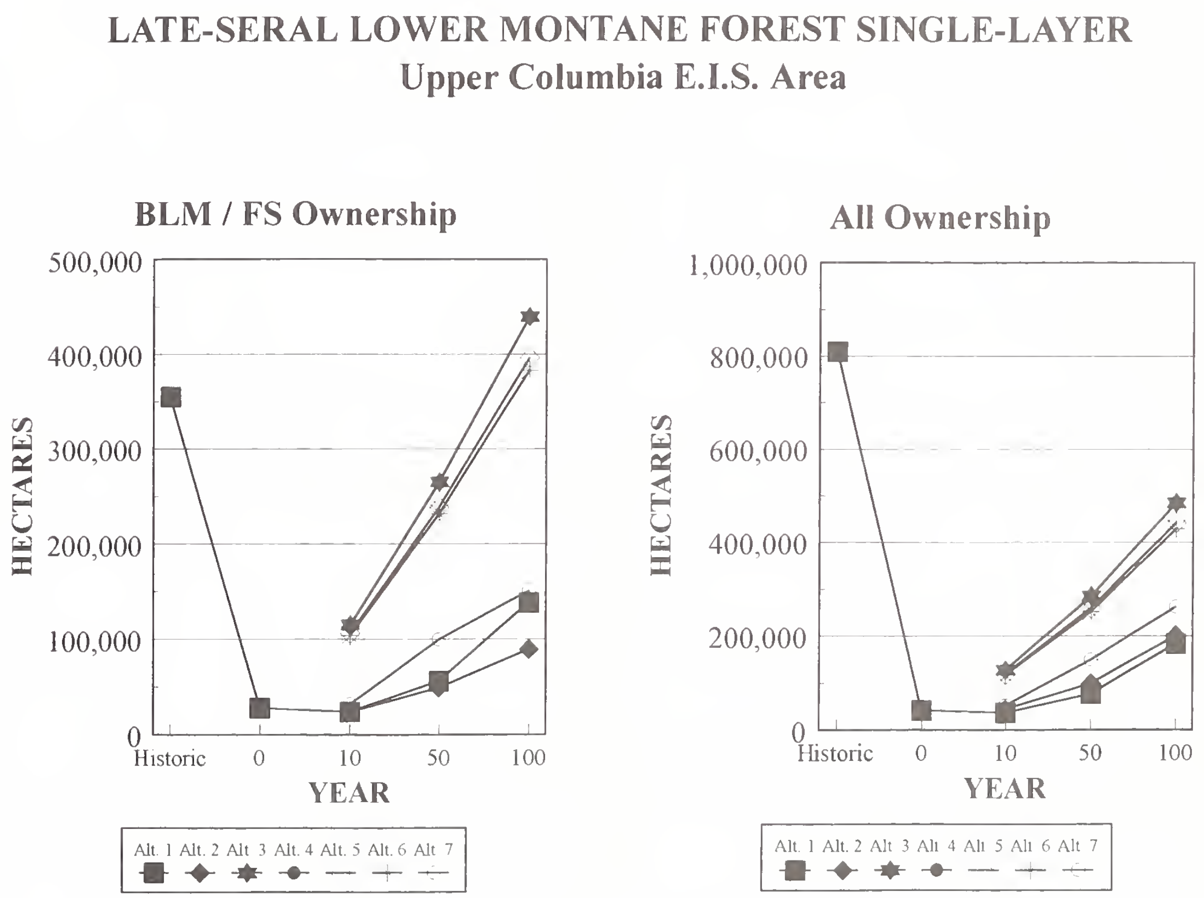


Figure 2.55 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the late-seral lower montane forest single-layer for the Eastside EIS area.

LATE-SERAL LOWER MONTANE FOREST SINGLE-LAYER
Upper Columbia E.I.S. Area

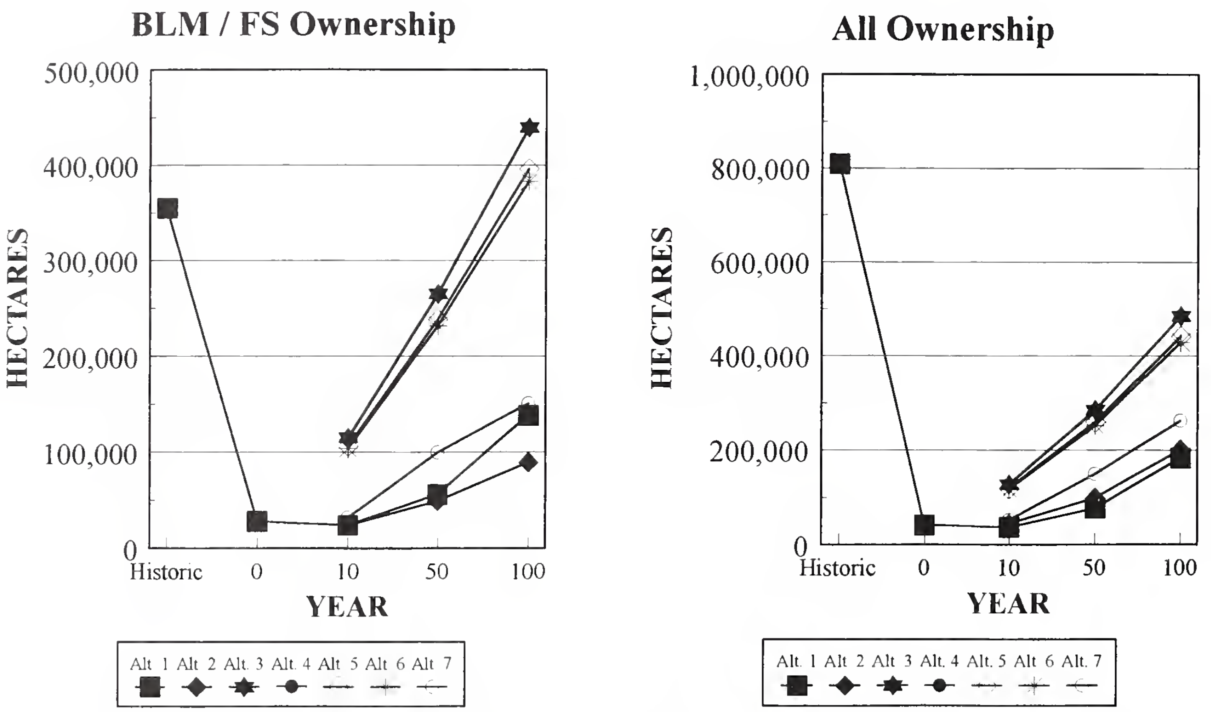


Figure 2.56 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the late-seral lower montane forest single-layer for the Upper Columbia River Basin EIS area.

The transition from late-seral single-layer forests to multi-layer forests involves regeneration and growth of shade-tolerant species in the understory; this occurs as a result of fire exclusion in underburning regimes that support late-seral single-layer communities. The transition to mid-seral results from development of understory tree layers, increased stress, consequent loss of overstory trees and retrogression to the mid-seral stage.

Alternatives 1 and 2 would continue transition of this community to multi-layer or mid-seral. This transition would be associated with high mortality of large and intermediate-size trees from stress, insect, disease, and wildfire, along with associated effects of salvage logging. Alternatives 3 through 6 would have relatively high levels of net transitions to the late-seral single-layer stage, with the transition pattern being similar to this type's native regime. Alternative 7 would follow the predicted transition for the reserve area and be similar to Alternative 3 in the non-reserve areas.

Composition and Structure: The structure of the late-seral single-layer communities would be closest to their native composition and structure in Alternatives 4 and 6, due to their emphasis on mimicking ecosystem processes with harvest, thinning, and prescribed fire treatments. Alternatives 1 and 2 would tend to produce multi-layer or

mid-seral communities in place of the late-seral single-layer community. Depending on the local priorities and degree of ecological emphasis, Alternative 3 would produce structures having moderate similarity to the native regime. Alternative 5 would be similar to Alternative 1 in the higher production areas, and to Alternative 3 in other areas. Alternative 7 would have structures similar to Alternative 3 in the non-reserve areas, and to current structures in the reserve areas.

Fire, Disturbance, and Treatments: Historical harvest patterns with selection for large older trees, combined with fire exclusion, have shifted the multi-layer late- and mid-seral types to the benches and ridges, which historically were subject to relatively frequent underburning that maintained the late-seral single-layer community.

The traditional harvest and fire exclusion in Alternatives 1 and 2 would result in continued decline of the late-seral single-layer type. Thinning, harvest units, and prescribed fires in Alternatives 4 and 6 would be similar to the native disturbance regime. Alternative 6 would have a slower transition than Alternative 4. Alternative 5 would have a moderate ability to shift patterns of this type, given the limitations related to economic priorities. Alternative 3 would proceed at varying rates, given the local emphasis. Alternative 7 would be similar to Alternative 3 and would not develop substantial amounts in the reserves because of loss to crown fire.

Alternatives 1 and 2 would have no management emphasis for late-seral single-layer communities. In Alternatives 4 and 6, the prescribed natural fire program (both planned and unplanned ignition) would play a primary role, with: some associated harvest, thinning, and prescribed fire treatments in subbasin group H; thinning, timber harvest, and fuel treatments to reduce risk of wildfire would be prioritized in group F; moderate emphasis on thinning, harvest, and fuel treatments would occur in groups J and L; and low emphasis in group M. In Alternative 3, the focus for thinning, harvest, and fuel treatments would be in groups J and L. In Alternative 5, there would be some focus on this type, but it would be prioritized in groups L and M.

Montane Forest Response

Early-seral Montane Forest —

Occurrence: Although most of this terrestrial community is in the moist forest, some can occur in the dry forest. Its current level is substantially above the historical level for the Eastside EIS area and substantially below the historical level for the Upper Columbia River Basin EIS area (figs. 2.57 and 2.58). The decline in the UCRB resulted from transition to mid-seral of areas burned in the late 1800s and early 1900s. Although most of the current amount in both areas was created through even-aged timber harvest treatments, some resulted from wildfires in the moist and dry forest zones. Since most treatments were clearcuts or shelterwood cuts at the time of harvest, there was little or no live or dead-standing and down tree structure representing this type's native composition and structure.

Response to Alternatives: Figures 2.57 and 2.58 depict the response of the early-seral montane forest. Under all alternatives, the amount of this terrestrial community would decline due to reduced harvest levels, changes in types of harvest, and succession to mid-seral communities. This decline would be positive for the EEIS area, but is too great in Alternatives 1, 2, and 7 in the UCRB. The restoration emphasis alternatives (3 through 6) would provide for less of a decline than Alternatives 1, 2, and 7. The primary disturbances producing early-seral montane forest would be:

- Alternative 1: harvest and wildfire
- Alternative 2: wildfire with some harvest
- Alternatives 3 through 6: harvest and prescribed fire with some wildfire.
- Alternative 7: wildfire with some prescribed fire and harvest.

Between the historical and current period, most early-seral montane developed subsequent to harvest of late-seral single- and multi-layer forest, and

wildfire in late-seral multi-layer forest. In all action alternatives (3 through 7), the early-seral would be produced primarily from the mid-seral forest, with minor amounts from the late-seral forest, while Alternatives 1 and 2 would continue to harvest mostly late-seral forests.

Composition and Structure: In general, the structure of these early-seral communities would be closest to the native composition and structure in Alternatives 4 and 6, due to their emphasis on mimicking ecosystem processes with harvest and prescribed fire treatments. Composition and structure of this type have changed substantially due to the loss of large, shade-intolerant western white pine from blister rust, selective harvest, and salvage. No other intolerant tree species of the moist forest potential vegetation group can fill the same ecological role in these environments as western white pine did in the native regime. It is unlikely that any of the restoration alternatives have sufficient emphasis on recovery of rust-resistant western white pine to produce large trees even in the long term, but Alternative 4 has the most emphasis.

Alternative 1 would produce early-seral communities similar to tree regeneration plantations, with uniform spacing and size. Alternative 2 would be predominantly small harvest units or areas of wildfire that would be salvage logged and planted.

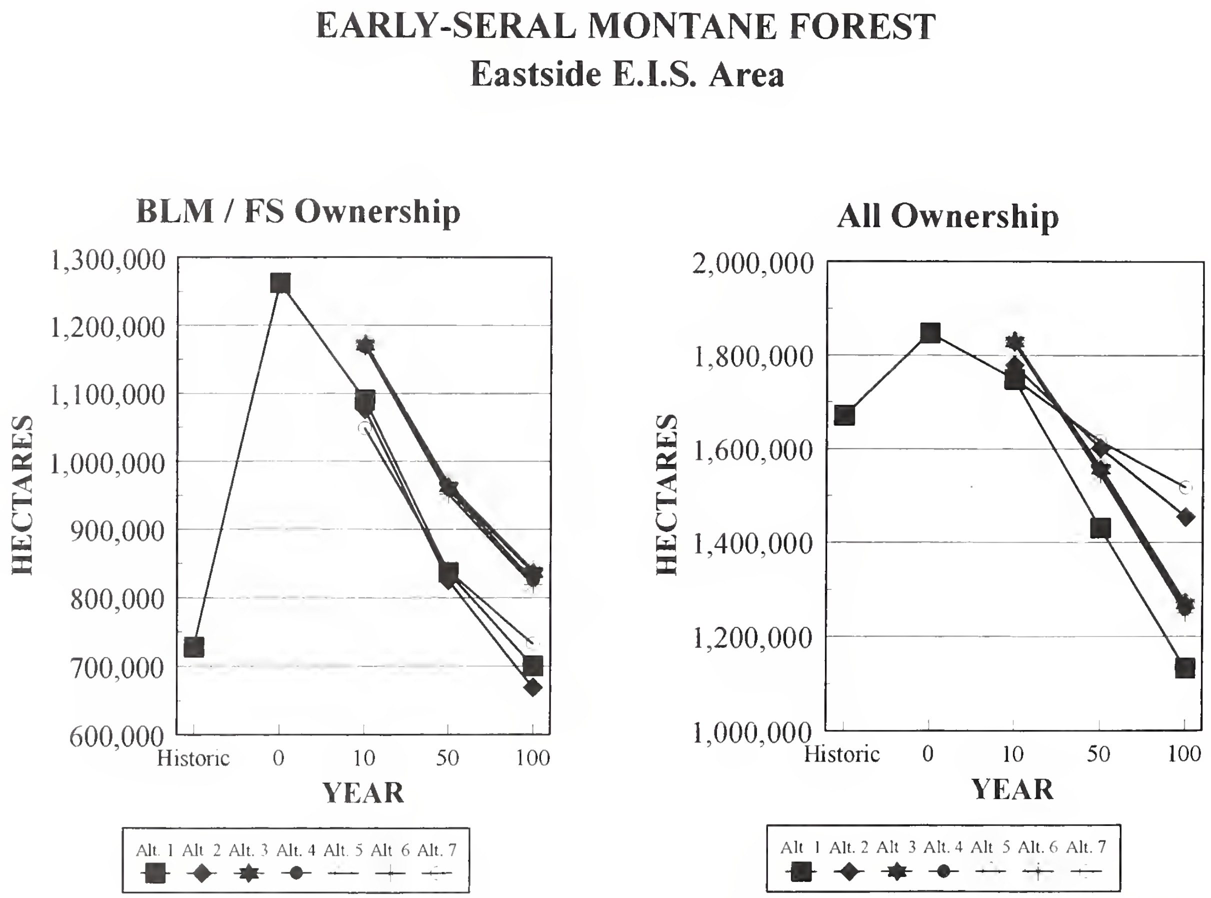


Figure 2.57 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the early-seral montane forest for the Eastside EIS area.

Depending on the local priorities and degree of ecological emphasis, Alternative 3 would have structures with moderate similarity to the native regime. Alternative 5 would be similar to Alternative 1 in the higher production areas, and to Alternative 3 in other areas. Alternative 7 would have structures similar to Alternative 3 in the non-reserve areas, and to wildfire-created structures in the reserve areas.

Fire, Disturbances, and Treatments: The current early-seral that was created in the moist forest is typically in the wrong spatial location for the fire regime. Historically, this type occurred on the steeper landforms where climate and topography supported a crown fire regime that cycled mid-seral communities. Past harvest patterns have typically created early-seral montane forests on terraces and foot slopes where the historical fire regime was a mixed, creeping, spotting type of fire producing late-seral structures; some were also created on benches and ridges historically located in a relatively-frequent underburning regime that maintained open (park-like) late-seral single-layer structures.

Harvest units and prescribed fires in Alternatives 1 and 2 would continue harvest in the same pattern as the current. Wildfire in Alternative 2 would tend to create this type in the wrong topo-

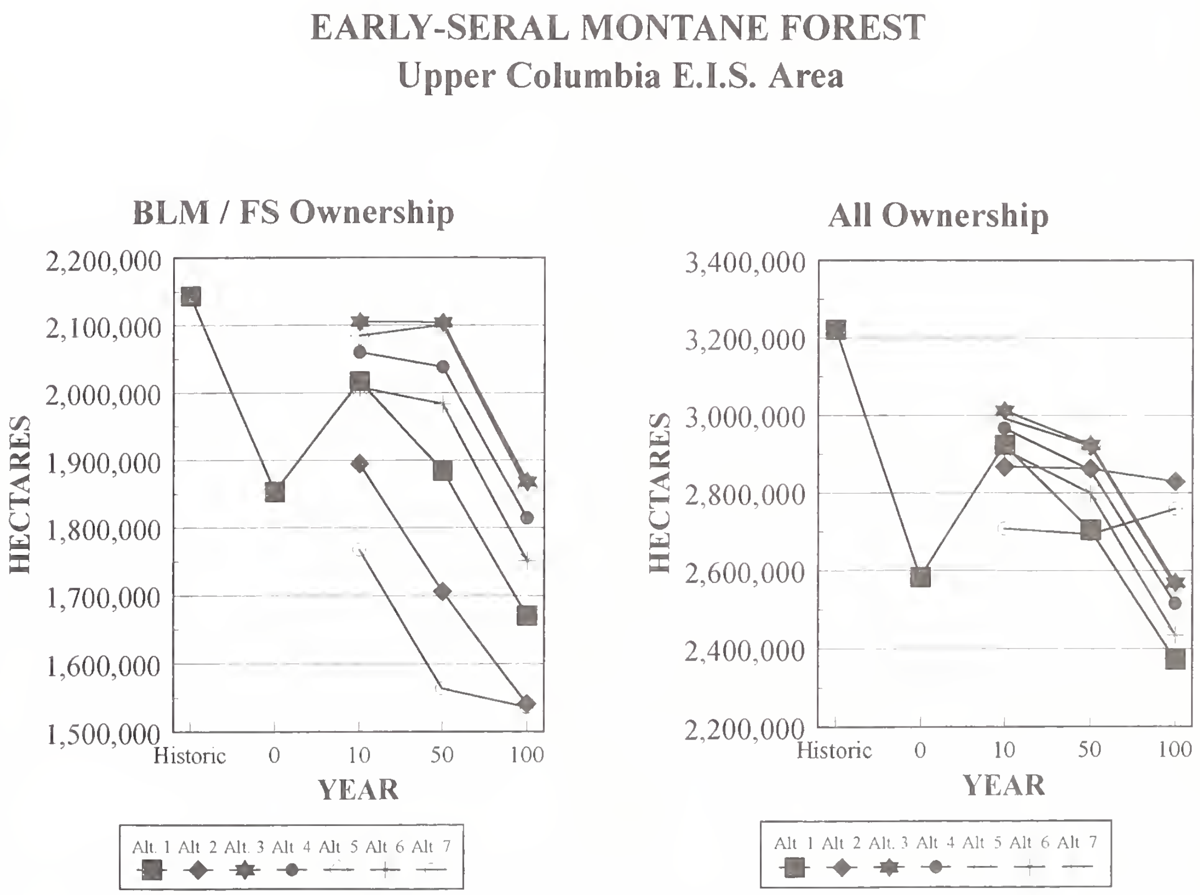


Figure 2.58 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the early-seral montane forest for the Upper Columbia River Basin EIS area.

graphic position, due to fuel accumulation on benches and ridges. Harvest units and prescribed fires in Alternatives 4 and 6 shift patterns to the native regime, except that Alternative 6 would transition at a slower rate. Alternative 5 would provide some emphasis for shifting patterns of this type, because of its emphasis on managing for economic efficiency in the more productive moist forest. Alternative 3 would proceed at a variable rate depending on the local emphasis. Alternative 7 would be similar to Alternative 3 in the non-reserve areas, and to wildfire-created structures in the reserve areas.

Spatial Distribution of Activities: In Alternatives 1 and 2, disturbances and treatments that create this type would generally be scattered throughout all subbasin groups. In Alternatives 4 and 6, the prescribed natural fire program (both planned and unplanned ignition) would play a primary role, with associated restoration, harvest, and thinning treatments in subbasin group H; timber harvest and thinning with fuel treatments to reduce risk of wildfire prioritized in group F; moderate emphasis on fuel and harvest and thinning treatments in groups J and L; and low emphasis in group M. In Alternative 3, harvest thinning and fuel treatments would be focused on groups J and L. Alternative 5 would not have focus on this type, but it would be created primarily in groups L and M.

<u>Mid-seral Montane Forest</u> —

Occurrence: Much of this terrestrial community is in the moist forest, but substantial amounts occur also in the dry forest. The current level is much higher than historical levels on BLM- and FS-administered lands and all ownerships in both EIS areas (figs. 2.59 and 2.60).

Response to Alternatives: Figures 2.59 and 2.60 depict the response of this terrestrial community. For all alternatives, the response pattern would be a general increase for about 50 years, then a slight decline to levels substantially greater than current amounts by year 100 in the Eastside EIS area. In the Upper Basin, the decline would occur to year 50 and then level at about the historical amount to year 100. This decline is only partially related to our harvest management activities; the primary factor is succession from this stage to the late-seral multi-layer stage in both the dry and moist forests.

Community Transition: From the historical to current period, this type primarily transitioned from the early-seral and the late-seral forests. The net change from early-seral forests to mid-seral is part of normal succession, whereas the net change from late-seral forests to mid-seral is primarily a response to fire exclusion, insect and disease maintaining the mid-seral, and retrogression from the late-seral forests.

As a result of fire exclusion, the late-seral forests convert gradually to mid-seral typically through loss of the large overstory trees from stress, insect, and disease mortality. This conversion is associated with a lack of understory- and mixed-behavior fires in the late-seral stage. Much of the mid-seral stage also stays in the mid-seral stage when there are no mixed-behavior fires to create a thinning effect and accelerate growth of survivor trees. Traditional harvest of large trees, leaving the smaller trees, also causes this same sort of retrogression.

We note the trend in mid-seral that first declines, and then levels out between the 50- to 100-year period, in the Upper Columbia River Basin EIS area. Unless wildfires consume the late-seral, this shift would occur as large amounts of late-seral multi-layer communities retrogress to mid-seral. In the Eastside EIS area, the trend of increasing mid-seral does not start to decline till after 50 years. In contrast, the Upper Columbia River Basin EIS area is currently declining and continues to decline until the 50-year period and then levels out. Much of the UCRB EIS area was in an early-seral condition at the turn of the century, fires were not excluded until a later period, and harvest has not been as extensive, in comparison with the EEIS area. Consequently, the same trends are occurring in both areas, but at very different times.

None of the alternatives would differ substantially in the first 50 years, but by 100 years the restoration alternatives (3 through 6) would result in

lower amounts of this type than Alternatives 1 and 2. The transitions from mid-seral in Alternatives 1 and 2 would generally cycle within the community, or to late-seral multi-layer stages. This pattern of change would be associated with high mortality of large and intermediate-size trees from stress, insects, disease, and wildfire, along with the associated effects of salvage logging. Alternatives 3 through 6 would have much lower levels of net transitions to the mid- and late-seral multi-layer stages, with increased transition to early-seral stages. Alternative 7 would be similar to Alternative 3 in the non-reserve areas. In Alternative 7 reserve areas, wildfire would convert some mid-seral to early-seral communities, resulting in less mid-seral than in Alternatives 3 through 6. None of the alternatives would reduce the amount of total mid-seral below the current level, or even approximate a trend toward the historical level in the Eastside EIS area. In the Upper Columbia River Basin EIS area, no alternative would reduce the amount of total mid-seral substantially below the historical level.

Fairly rapid growth rates in the moist forest, along with rapid regeneration, cause dynamic shifts in mid-seral communities through time. The pattern on all ownerships in the Eastside EIS area would not shift substantially from the current amount, due to the fairly high harvest levels in this stage.

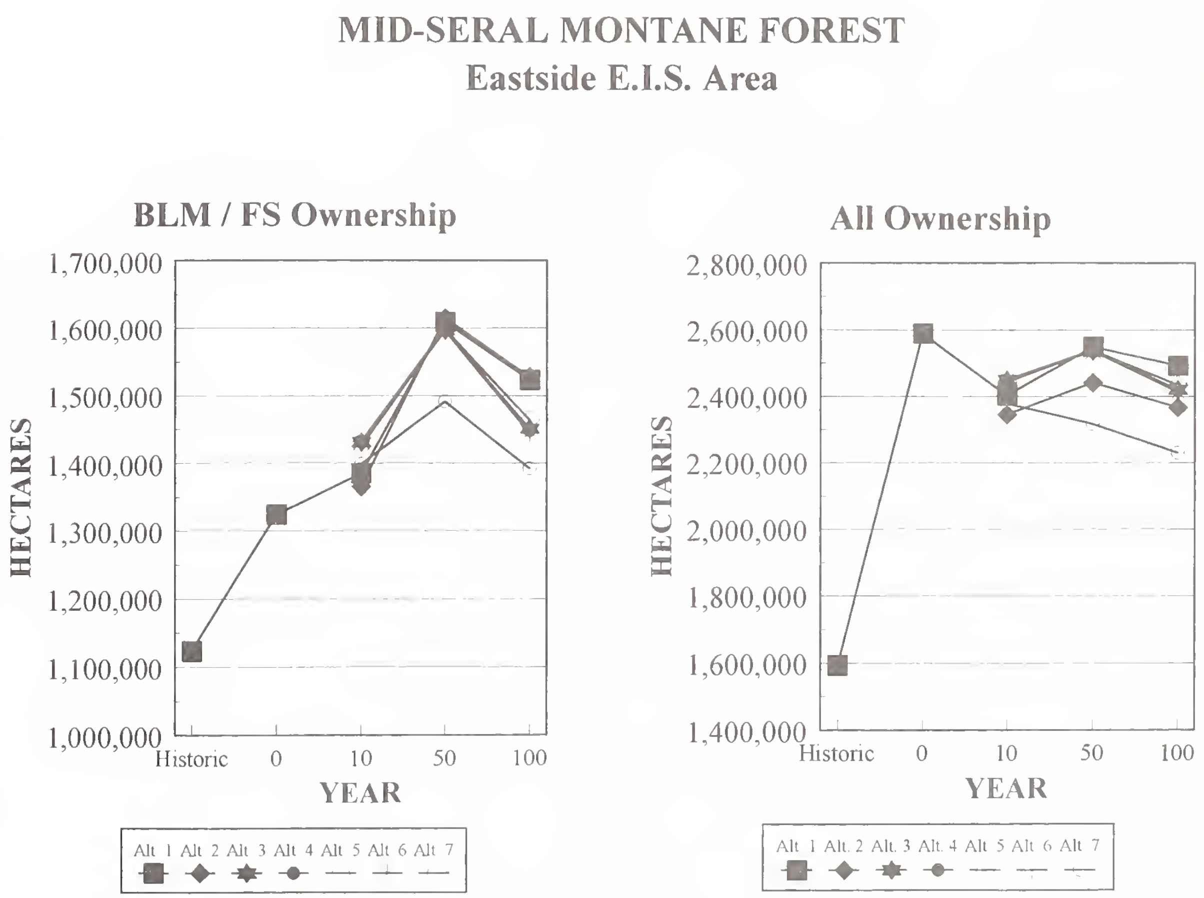


Figure 2.59 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the mid-seral montane forest for the Eastside EIS area.

MID-SERAL MONTANE FOREST
Upper Columbia E.I.S. Area

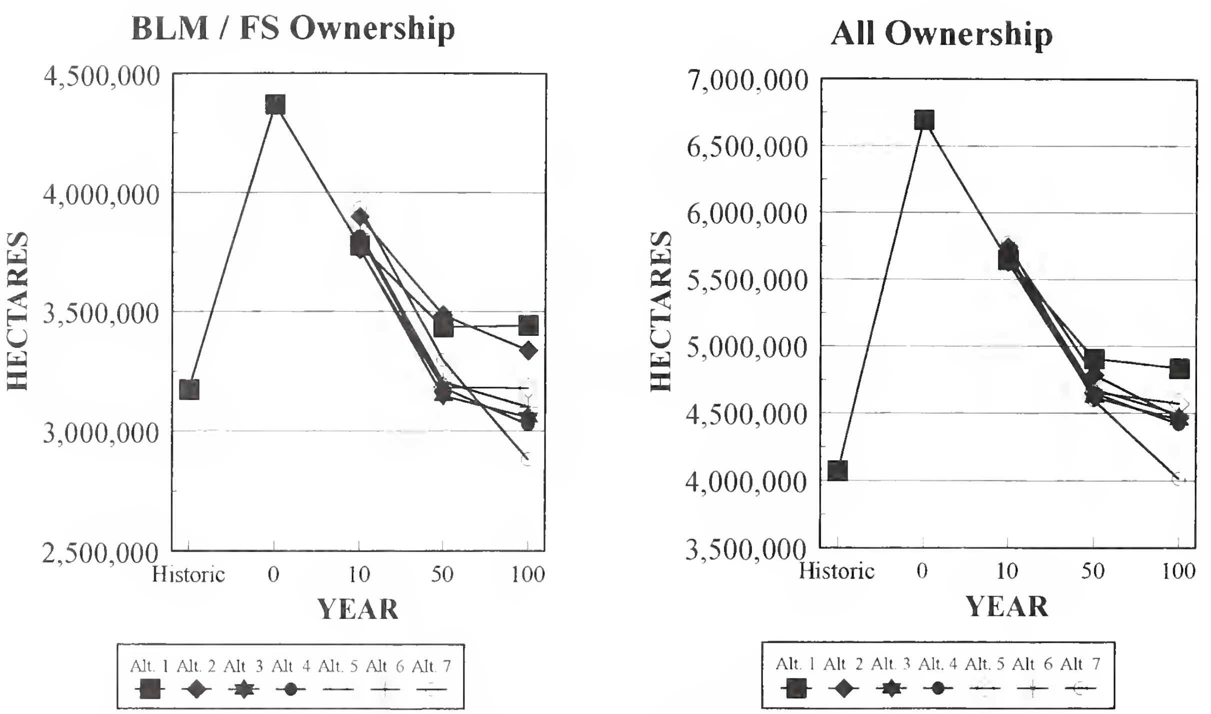


Figure 2.60 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the mid-seral montane forest for the Upper Columbia River Basin EIS area.

Composition and Structure: The large amount of mid-seral forest in both the moist and dry forest potential vegetation groups is of considerable concern relative to ecological process, composition, and structure. This condition appears to be a cumulative effect of several conditions:

- There are large amounts of early-seral in roaded areas in the Eastside EIS area and moderate amounts in the Upper Columbia River Basin EIS area that are transitioning to mid-seral in areas previously harvested or burned with wildfire.
- There is a large component of mid-seral, typically in roadless areas; it transitioned from early-seral which developed in the late 1800s and early 1900s as a result of large wildfires. Currently, the mid-seral is stagnated due to the lack of thinning-type fires.
- The Eastside EIS area has a large component of late-seral, typically in roadless areas or often associated with riparian environments; this late-seral is transitioning to mid-seral due to stress, insect, and disease mortality of the large overstory trees from lack of thinning and mixed severity fires.
- The Upper Columbia River Basin EIS area has a large component of mid-seral in roaded areas, which transitioned from late-seral single-layer

due to selective harvest of the large trees and development of residual understory trees.

- There is also a large component of mid-seral in roadless areas; the transition in these areas was from late-seral single-layer, then into multi-layer with fire exclusion, and finally into mid-seral due to retrogressive loss of the large overstory trees from stress, insect, and disease mortality.

It is apparent that none of the emphasis strategies for the restoration alternatives (3 through 6) would provide the level of activity to reverse these trends, spatially or temporally, within the next 50 years. Since much of the area in this stage is also present in large contiguous patches, the effects of contagion from insect/disease mortality and wildfire would likely result in large crown fire events and insect epidemics throughout all alternatives. Although the extent of this effect was not predicted with our scale modeling, the result may reduce the mid-seral stage due to production of large areas of early-seral. This could have the undesirable result of losing remaining residual large overstory trees and late-seral patches contained within the mid-seral matrix, the resulting effect being a series of large shifts from high to low levels of mid- and early-seral stages, with few other stages.

Composition and Structure: At a large scale, the overall effect on the community structure and composition is simplification related to the loss of fire-related processes and departure from the inherent succession/disturbance regime. The future of the mid-seral montane community as a whole is very unpredictable. Since much exists in roadless areas that are strongholds for native fish populations, and/or in watersheds with high sensitivity to roads and harvest activities, a design for restoration of these landscapes would require hierarchical risk analysis.

In general, the structure of the mid-seral communities would be closest to the native composition and structure in Alternatives 4 and 6, due to their emphasis on mimicking ecosystem processes with harvest and prescribed fire treatments. Alternative 1 would produce mid-seral communities with uniform spacing and size. Alternative 2 would produce many stands of high density and small dead-standing and down trees. Depending on the local priorities and degree of ecological emphasis, Alternative 3 would produce structures having moderate similarity to the native regime. Alternative 5 would have structures similar to Alternative 1 in the higher production areas, and to Alternative 3 in other areas. Alternative 7 would have structures similar to Alternative 3 in the non-reserve areas, and to current structures in the reserve areas.

Fire, Disturbances, and Treatments: The current mid-seral stage in the moist forest is typically found in all fire regimes of the moist forests. Historically, this type occurred on the steeper landforms where climate and topography provided for a crown fire regime that cycled mid-seral communities to early-seral communities and accelerated some patches into late-seral communities. Most historical mid-seral structures had a scattered component of large residual trees. Historical harvest and fire exclusion have produced structures that are often very dense and have lost the scattered large residual trees.

Continued traditional harvest and fire exclusion in Alternatives 1 and 2 would increase the amount of mid-seral that is inconsistent with the native succession/disturbance regime. Thinning, harvest units, and prescribed fires in Alternatives 4 and 6 would shift patterns closer to the native regime but Alternative 6 would transition at a slower rate. Alternative 5 would have moderate ability to emphasize a shift in patterns for this type, due to its economic priority limitations. Alternative 3 would proceed at varying rates, given its emphasis at a local level. Alternative 7 would be similar to Alternative 3 in the non-reserve areas, and be highly dynamic and variable in response to wildfire in the reserve areas.

Spatial Distribution of Activities: In Alternatives 1 and 2, disturbances and treatments that affect this type would generally be scattered throughout all the subbasin groups. Alternatives 4 and 6 would emphasize the prescribed natural fire program

(both planned and unplanned ignition), with: some associated harvest, thinning, and prescribed fire treatments in subbasin group H; thinning, timber harvest, and fuel treatments to reduce risk of wildfire prioritized in group F; moderate emphasis on thinning, harvest, and fuel treatments in groups J and L; and low emphasis in group M. In Alternative 3, the focus for thinning, harvest, and fuel treatments would be in groups J and L. Alternative 5 would have some focus on mid-seral communities, but it would be prioritized in groups L and M. Alternative 7 would be similar to Alternative 3 in non-reserve areas and have few activities in reserves.

The most substantial risks would develop where mid-seral montane forests are on the moist end of the dry forest; on the dry end of the moist forest; and in steep, rugged terrain in subbasin groups L, F, and J.

Late-seral Multi-layer Montane Forest —

Occurrence: Much of this terrestrial community is in the moist forest, but a substantial amount is also in the dry forest. The current level is much higher than the historical levels within BLM- and FS-administered lands and all ownerships for the EEIS area, but much lower for the UCRB (figs. 2.61 and 2.62). Most of the current late-seral montane forest that is in roaded BLM- and FS-administered areas do not have old-forest attributes. A substantial amount of late-seral has been harvested with selective cuts for large trees, leaving a structure that meets the definition of late-seral multi-layer but with very different characteristics than the native structures. Some of the current spatial placement of this type is in roadless BLM- and FS-administered areas; structures here have old-forest characteristics, but typically have much higher density due to the exclusion of underburning, mixed severity fires, and the lack of ecological harvest and thinning activities.

Large amounts of the late-seral multi-layer community have been historically and selectively logged in a contiguous band from the Upper Klamath to the Blue Mountains ERUs. This band follows a general foothill and mountainous forest terrain belt that is closely aligned with a high lightning fire ignition probability. A similar band occurs along the foothills of the Northern and Southern Cascades ERUs where the mountains meet with the breaklands of the Columbia River. Similar bands occur along the wildland interface areas of many subbasins in the Rocky Mountains in the UCRB area. The subbasins in these areas have many sensitive issues, including:

- High potential for crown fire and high severity fires.
- Moderate to high amounts of urban/wildland interface.
- High concern for maintenance of visual green tree cover.
- Strong public sentiments against prescribed fire and logging.
- Watersheds important for aquatic species.
- Various critical habitats for terrestrial species.
- Areas that are important as security/hiding cover for big game.

Response to Alternatives: Figures 2.61 and 2.62 indicate the response of the late-seral montane multi-layer community. In the EEIS area on BLM- and FS-administered lands, all alternatives follow a similar pattern of decline to year 50 and then a leveling-off or slight increase. This is in response to retrogressive mortality from traditional harvest and insect, disease, and stress in Alternatives 1 and 2, wildfire in Alternative 7, and restoration, harvest, thinning, and prescribed fire in Alternatives 3 through 6. In contrast, the trend in the UCRB is a steep increase in response to succession of mid-seral to late-seral in all alternatives with varying levels of dampening effects.

In the Eastside EIS area, Alternative 1 would show the strongest decrease in the amount of late-seral multi-layer montane forest over the 100-year period, primarily in response to timber harvest, with some wildfire. In the Upper Columbia River Basin, Alternative 1 would show the least increase.

LATE-SERAL MONTANE FOREST MULTI-LAYER
Eastside E.I.S. Area

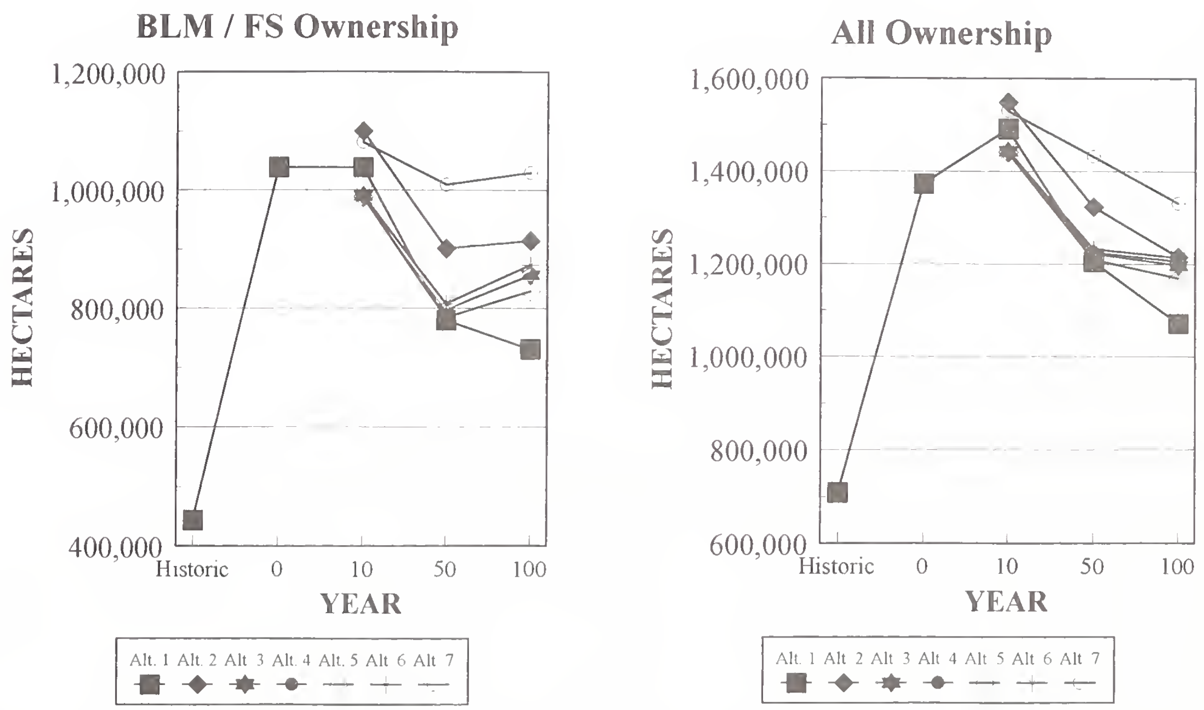


Figure 2.61 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the late-seral montane forest multi-layer for the Eastside EIS area.

The restoration emphasis alternatives (3 through 6) would result in a decline through the 50-year period, reversing to an increasing trend between 50 and 100 years. This response would occur as a result of harvest, thinning, and prescribed fire, along with the associated affects of wildfire. The shift in trend between 50 and 100 years would be due to much of the current mid-seral stages in roadless areas and early-seral stages in roaded areas changing into late-seral stages. Alternative 2 would have much less reduction than those alternatives. Alternative 7 would have a similar transition curve to Alternative 3 in the non-reserve areas, affected primarily by harvest, thinning, and prescribed fire; there would be a steep decline in the reserve areas under Alternative 7, primarily due to wildfire.

Community Transition: The historical to current transition to late-seral multi-layer montane forest in roaded areas was caused by fire exclusion and historical harvest. Traditional harvest treatment, which includes the selective cutting of commercial trees, typically leaves live and dead standing trees of sufficiently large size that the community is still classified as late-seral. However, such structures are not similar to native structures and usually do not qualify as old forests in terms of age and structural diversity.

The composition of these structures tends to shift markedly over time in response to selective harvesting of both the species and individuals having large size and sound wood. This harvest practice also often results in the loss of genetic diversity. These structures are very similar in many respects to the dense mid-seral structures discussed previously. Both structures have high risk of mortality from stress, insect, and disease, along with the associated risk of wildfire. Net productivity generally declines. In our modeling of disturbance probabilities at this scale, we were unable to account for a higher probability of disturbance in these types compared to nonharvested patches.

Between the historical and current period, this type primarily transitioned from the early-seral, mid-seral, or late-seral single-layer communities. Some of this community was present historically on areas with mixed fire regimes, typically on moist foot slopes; or within areas that had infrequent, creeping, spotting type fires, typically in riparian areas. The transition from late-seral, single-layer forests involves regeneration and growth of shade-tolerant species into the understory. Such conversion occurs gradually as a result of either fire exclusion in underburning, or mixed fire regimes that support late-seral single-layer communities. Late-seral multi-layer communities

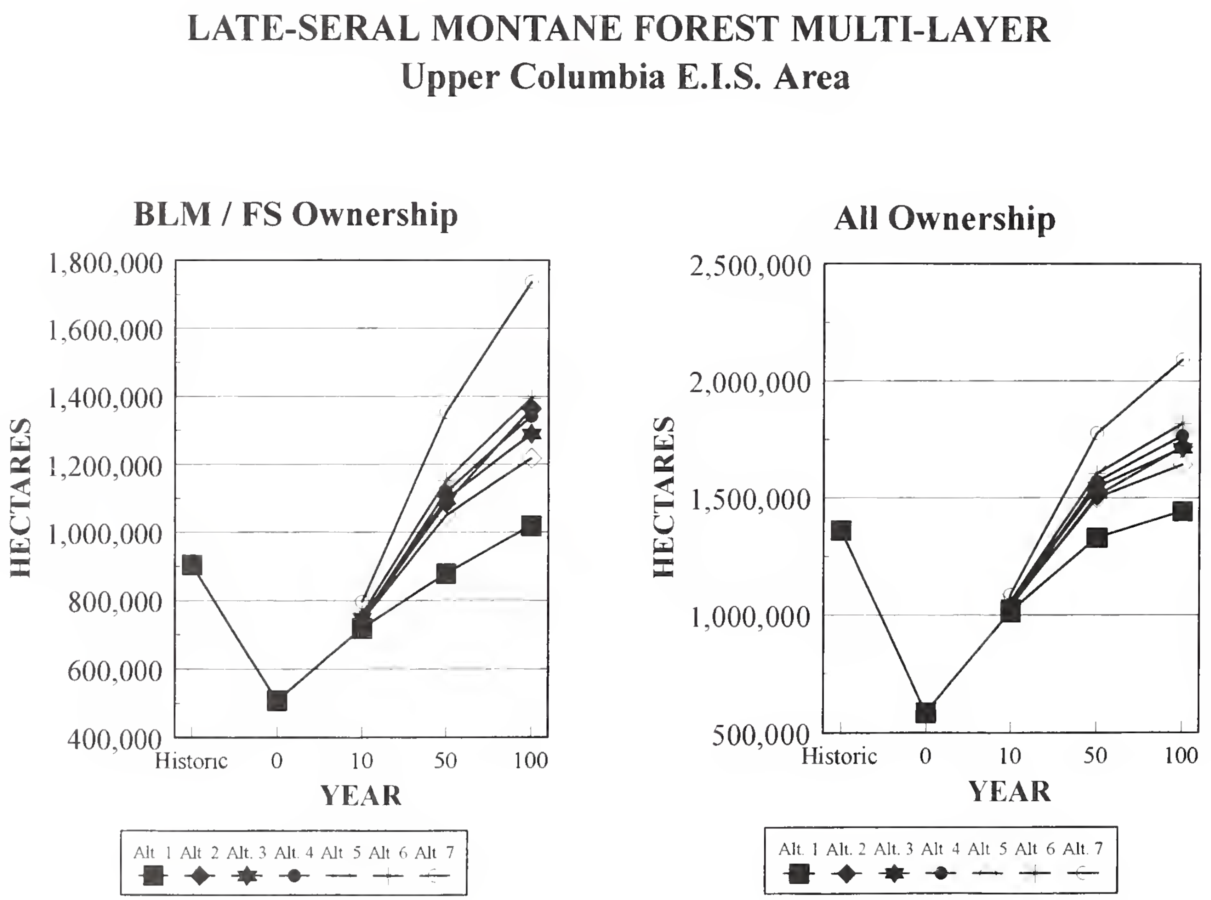


Figure 2.62 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the late-seral montane forest multi-layer for the Upper Columbia River Basin EIS area.

also develop from mid-seral stages, given enough time without a crown fire. Historically, mixed-type fires occurred often in the mid-seral stages; through thinning, these fires accelerated their structural development to late-seral multi-layer, that was eventually converted to a single-layer with an underburn or a cycled to early-seral with a crown fire.

Alternative 1 would reduce the transition to late-seral multi-layer the most across all alternatives, but would continue to create structures that are inconsistent with the disturbance regime. Alternative 2 would produce a slight decline in the transition to late-seral multi-layer. Although Alternatives 3 through 6 would slow the current trend, between year 50 and 100 an overwhelmingly large component of early- and mid-seral would shift into late-seral; these restoration alternatives would not treat sufficient area to substantially change this trend.

The overall future pattern for Alternatives 1 and 2 on the dry end of the moist forest, as well as the moist end of the dry forest, would incur high mortality of large and intermediate-size trees from stress, insect, disease, and wildfire, along with the associated effects of salvage logging. Alternatives 3 through 6 would have lower levels of net transitions to the late-seral multi-layer stage, and substantial increases in the transitions to the late-seral single-layer community. This pattern would be similar to the native regime. Alternative 7 would be similar to Alternative 3 in the non-reserve areas; in the reserve areas under Alternative 7, the response would be highly unpredictable due to the underestimated probabilities for large contiguous wildfires and insect epidemics in those areas.

In the future and for all alternatives, the increase in the late-seral multi-layer structure would be distributed through the same ecological reporting units, and also into the Northern Glaciated Mountains ERU in the Eastside EIS area, and through most ERUs having high forest components in the Upper Columbia River Basin. Surrounding the current core of subbasins with this late-seral type, many more subbasins would develop similar conditions as this type increases.

Composition and Structure: In general, the composition and structure of the late-seral multi-layer communities would be closest to the native regime in Alternatives 4 and 6, because they emphasize mimicking ecosystem processes with harvest and prescribed fire treatments. Alternatives 1 and 2 would tend to produce very dense, multi-layer communities subject to high mortality from fire exclusion, or communities where effects of harvest remove the large, old trees. Depending on local priorities and degree of ecological emphasis, Alternative 3 would result in structures having moderate similarity to the native regime. Alternative 5 would be similar to Alternative 1 in the higher production areas, and to Alternative 3 in other areas. Alternative 7 would have structures similar to Alternative 3 in the non-reserve areas, and to current structures in the reserve areas.

Fire, Disturbances, and Treatment: The current late-seral multi-layer community in the dry and moist forest is typically found in all dry forest fire regimes. Historically, this type occurred on the moister landforms where the climate and topography provided for a succession/disturbance regime that allowed development of late-seral, multi-layer shade-intolerant-dominated communities. This type ranged in patch size from large to small, depending on the geographic area, terrain, and climate. Historical harvesting, which involved selection of the large older trees in combination with fire exclusion, produced multi-layer late-seral types on steep dry slopes typically subject to cycling disturbances, and on benches and ridges where the disturbance regime maintained late-seral, single-layer structures.

Continued traditional harvest and fire exclusion in Alternatives 1 and 2 would increase the amount of this structure that is out of proportion with the native disturbance regime. Thinning, harvest units, and prescribed fires in Alternatives 4 and 6 would shift patterns to the native disturbance regime, but Alternative 6 would proceed at a slower rate. Alternative 5, given its economic priority limitations, would have moderate ability to emphasize patterns. Alternative 3 would proceed at varying rates due to local emphasis. Alternative 7 would be

similar to Alternative 3 in non-reserve areas, and similar to current conditions in the reserves.

Spatial Distribution of Activities: In Alternatives 1 and 2, disturbances and treatments affecting the late-seral multi-layer montane forest would generally be scattered throughout all subbasin groups. In Alternatives 4 and 6, the prescribed natural fire program (both planned and unplanned ignition) would play a primary role, with: some associated harvest, thinning, and prescribed fire treatments in subbasin group H; thinning, timber harvest, and fuel treatments to reduce risk of wildfire prioritized in group F; moderate emphasis on thinning, harvest, and fuel treatments in groups J and L; and low emphasis in group M. In Alternative 3, the focus for thinning, harvest, and fuel treatments would be in groups L and J. Alternative 5 would have some focus on this type, but it would be prioritized in groups L and M.

Late-seral Single-layer Montane Forest —

Occurrence: Most of this terrestrial community is in the dry end of the moist forest, or in the moist end of the dry forest. The current level is substantially lower in the EEIS area and higher in the UCRB than the historical level within BLM- and FS-administered lands, and for All ownerships (figs. 2.63 and 2.64). Historically, most land now supporting this type supported the late-seral

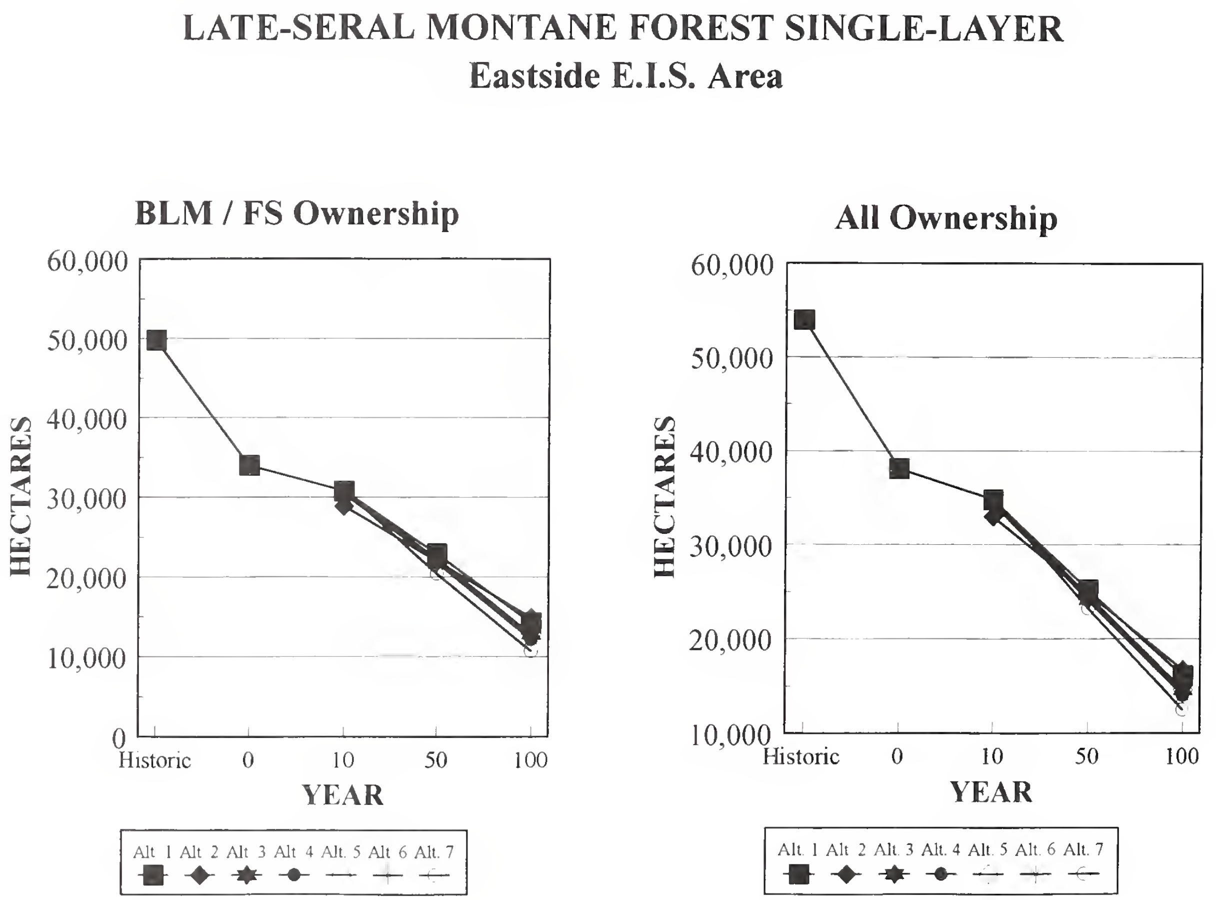


Figure 2.63 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the late-seral montane forest single-layer for the Eastside EIS area.

single-layer lower montane; in the moister environments, however, it supported western white pine or western larch. In cooler environments, lodgepole pine played an important role in this community. Selective harvest of the large ponderosa pine, western larch, and western white pine, in combination with fire exclusion, has resulted in the current condition for the EEIS area. The increase in the UCRB is primarily a result of fire exclusion. The current structure is interim to the mid-seral structures in both areas due to projected mortality of the remaining overstory trees from stress, insect, or disease or is interim to multi-layer structures as a result of regeneration of shade-tolerant species in the understory.

Response to Alternatives: Figures 2.63 and 2.64 depict the response of this terrestrial community. In the Eastside EIS area, Alternatives 1 and 2 would continue the steep decline in late-seral single-layer montane forest from the current level, to well below its historical level by year 100. In the Upper Columbia River Basin EIS area, all alternatives would result in a similar steep decline of this type. The restoration emphasis alternatives (3 through 6) would reduce this type's decline, but would not have sufficient emphasis to stabilize its decline at the historical level.

Achieving the historical level would be possible, if the average decade's management activities for

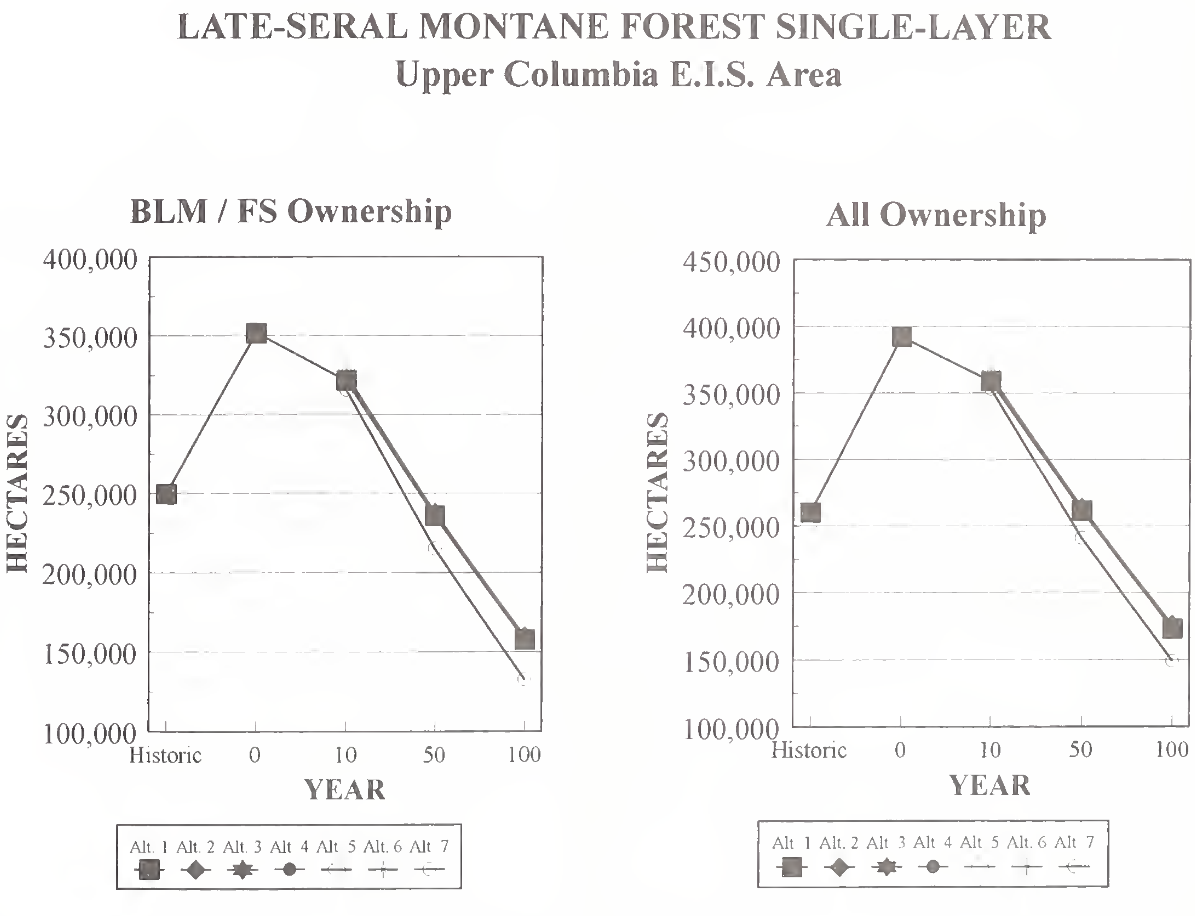


Figure 2.64 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the late-seral montane forest single-layer for the Upper Columbia River Basin EIS area.

late-seral single-layer montane were increased by about 50 percent, and if substantial emphasis were placed on managing for western white pine in the moister environments. It would be particularly difficult to achieve an increase in wilderness and semi-primitive areas. Alternatives 4 and 6 would be most effective in recovery of the dominant shade-intolerant tree species (western white pine, western larch, ponderosa pine, lodgepole pine).

Alternative 3 would have a moderate response. Alternative 7 would be similar to Alternative 3 in the non-reserve areas; in the reserve areas of Alternative 7, the transition would continue to late-seral multi-layer, except where wildfire would shift many to early-seral communities.

Community Transition: In the Eastside EIS area, between the historical and current period, there was a transition to the late-seral single-layer montane forest, primarily from the mid-seral forest, but also from the late-seral single-layer lower montane forest. For the Eastside EIS area the primary decrease in Alternatives 1 and 2 would be to mid-seral stages. This pattern of change would be associated with high mortality of large and intermediate-size trees from stress, insect, disease, and wildfire, along with the associated effects of salvage logging. Alternatives 3 through 6 would produce less decline than Alternatives 1 and 2 in this type, but the declines would also be associated primarily with transitions to the mid-seral stages. Alternative 7 would be similar to Alternative 3 in the non-reserve areas, but would result in a steeper decline than Alternative 3 in the reserve areas.

In the Upper Columbia River Basin EIS area, this stage increased from historical to current as a result of transition from mid- and early-seral. Future trends indicate transition via retrogression to mid-seral stages. The transition to mid-seral stages is associated with high mortality of large and intermediate-size trees from stress, insect, disease, and wildfire, along with the associated effects of salvage logging. Alternatives 3 through 6 would slow the decline with some fluctuation. Alternatives 1 and 2 would have a similar pattern to Alternatives 3 through 6, but with steeper declines. Alternative 7 would be similar to Alternative 3 in the non-reserve areas, but steeper decline than Alternative 3 in the reserve areas.

Composition and Structure: In general, the composition and structure of the late-seral single-layer communities would be closest to the native regime for Alternatives 4 and 6. This similarity of structure would result from the emphasis of these two alternatives on mimicking ecosystem processes with harvest and prescribed fire treatments; and also on regenerating species, such as western white pine, western larch, ponderosa pine, and lodgepole pine, which are shade-intolerant and somewhat more insect-, disease-, and fire-resistant than shade tolerant species. Alternatives 1 and 2 would tend to increase the transition to mid- and late-seral multi-layer stages, which are currently well above the historical levels. Depending on the local priority and degree of ecological emphasis, Alternative 3 would produce structures moderately similar to the native regime. Alternative 5 would be similar to Alternative 1 in the higher production areas, and to Alternative 3 in other areas. The non-reserve areas of Alternative 7 would have structures similar to Alternative 3, and the reserves would have structures similar to the current condition.

Fire, Disturbances, and Treatments: The combination of fire exclusion, blister rust, and historical harvest patterns has caused the decline of shade-intolerant, large, older trees; this has resulted in a predominance of shade-tolerant species in the overstory that are much more susceptible to insects, disease, and crown fire. Alternatives 4 and 6 most closely represent the native succession/disturbance regime. Moderate similarity is achieved by Alternative 3, with less similarity for 7, 5, 2, and 1, respectively.

Spatial Distribution of Activities: None of the alternatives would substantially address the overall problem concerning the amounts and rates of change in the montane forests. In general, the restoration Alternatives 3 through 6 would be more proactive than Alternatives 1 and 2. Neither

Alternative 1 or 2 would have management emphasis for this type. In Alternatives 4 and 6, the prescribed natural fire program (both planned and unplanned ignition) would play a primary role with: some associated harvest, thinning, and prescribed fire treatments in subbasin group H; thinning, timber harvest, and fuel treatments to reduce risk of wildfire prioritized in group F; moderate emphasis on thinning, harvest, and fuel treatments in groups J and L; and low emphasis in group M. In Alternative 3, the focus for thinning, harvest, and fuel treatments would be in groups J and L. In Alternative 5, there would be some focus on this type, but it would be prioritized in groups L and M.

Subalpine Forest Response

Early-Seral Subalpine Forest —

Occurrence: Most of this terrestrial community is in the cold forest, but some can occur in the moist forest. Also, most of the early-seral subalpine forest is located on BLM- and FS-administered lands. Its current level is substantially above the historical level for both EIS areas (figs. 2.65 and 2.66). Most of the current amount developed as a result of harvest in spruce cover types, blister rust mortality in whitebark pine cover types, and wildfire.

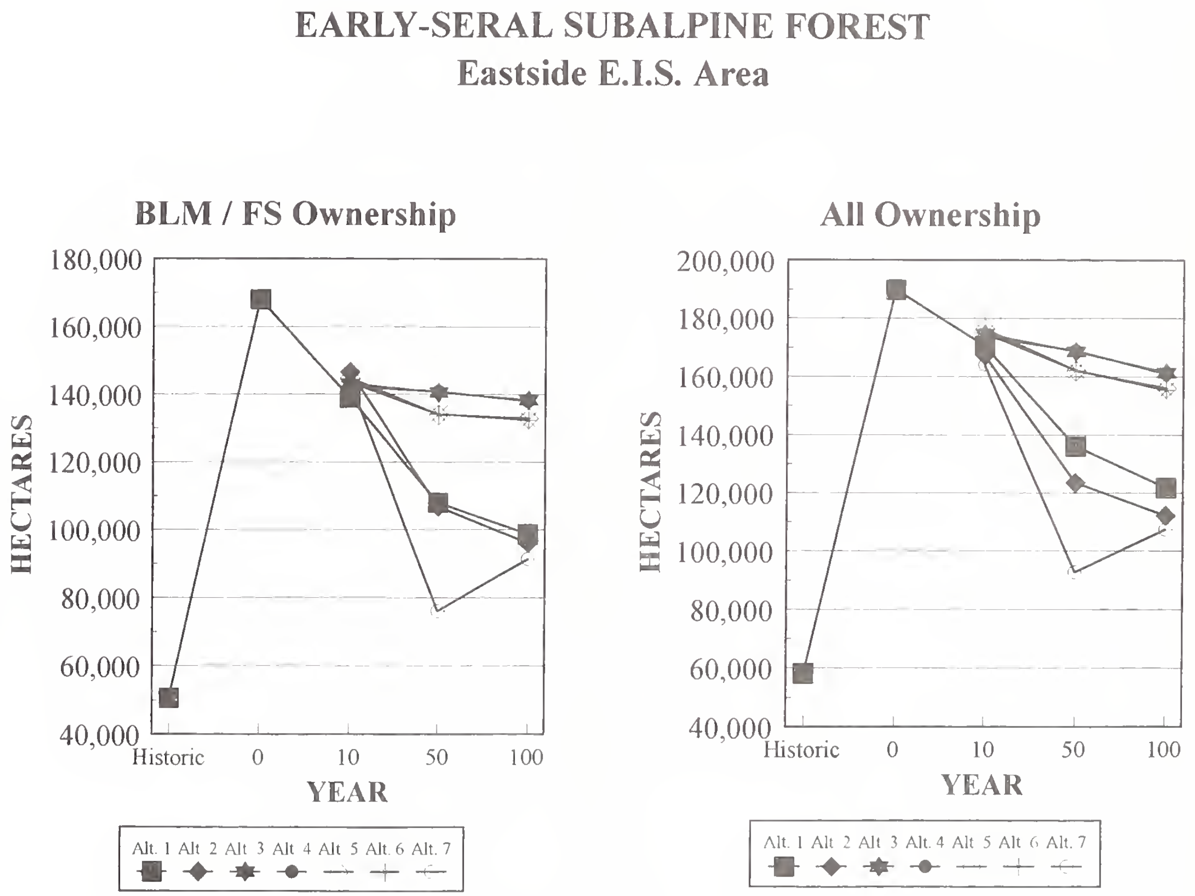


Figure 2.65 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the early-seral subalpine forest for the Eastside EIS area.

EARLY-SERAL SUBALPINE FOREST
Upper Columbia E.I.S. Area

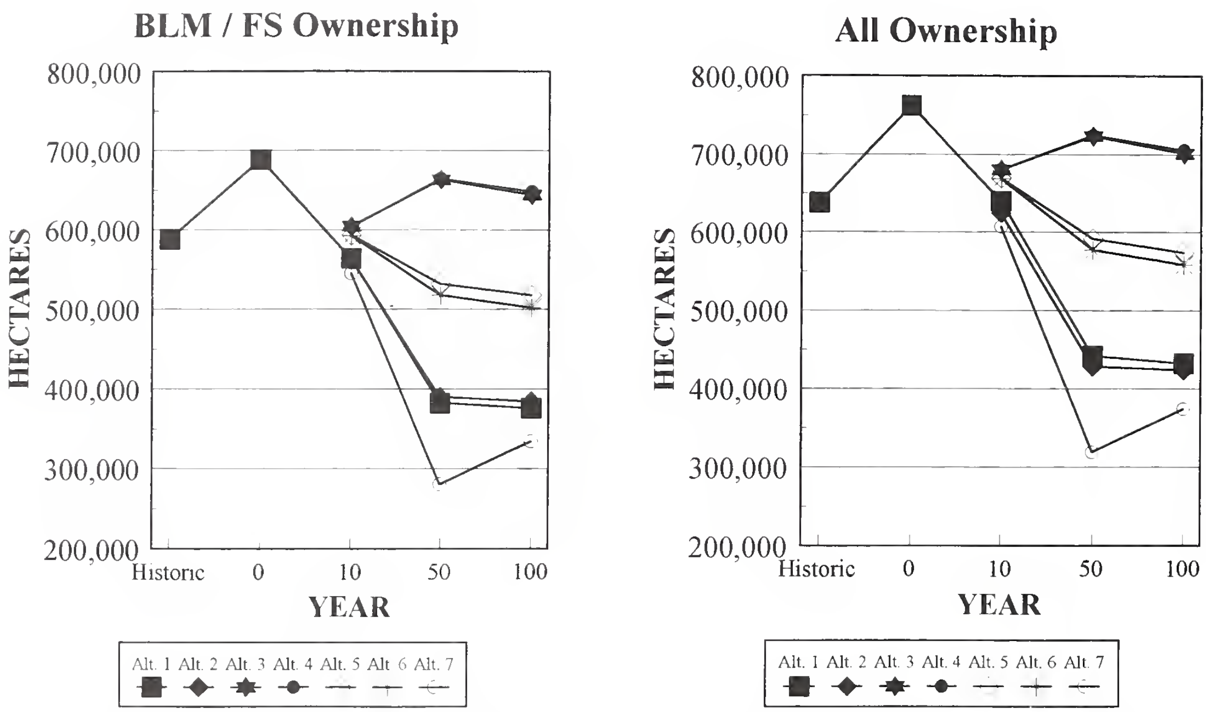


Figure 2.66 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the early-seral subalpine forest for the Upper Columbia River Basin EIS area.

Response to Alternatives: Figures 2.65 and 2.66 depict the response of this terrestrial community. All alternatives would reduce the amount of this terrestrial community due to reduced fire and harvest levels and the succession of the early-seral subalpine to mid-seral communities. The specific emphasis on recovery of whitebark pine in Alternatives 3, 4 and 6 should produce a more positive result than Alternatives 1 and 2. Alternatives 3 through 6 would not reduce the amount of this type as much as Alternatives 1, 2, and 7. The primary disturbances producing early seral subalpine would be:

- Alternative 1: harvest and wildfire.
- Alternative 2: wildfire with minor harvest.
- Alternatives 3 through 6: harvest and prescribed fire, with minor wildfire.
- Alternative 7: wildfire with minor harvest.

Composition and Structure: The ecological composition of early-seral subalpine forests has changed substantially with fire exclusion, which does not provide ash bed regeneration sites for the shade-intolerant species. The composition of trees regenerated in the early-seral stage are also substantially impacted by the decline in whitebark pine related to blister rust. The concern for these communities is that none of the other shade-

intolerant tree species of the cold forest potential vegetation group can fill the same ecological role as whitebark pine in these environments. None of the restoration alternatives (3 through 6) would have enough emphasis on prescribed fire relative to regeneration of rust-resistant whitebark pine to carry whitebark pine through to dominance in the mid- and late-seral stages.

In general, the composition and structure of these early-seral communities would be closest to the native regime in Alternatives 4 and 6, due to their emphasis on mimicking ecosystem processes with harvest and prescribed fire treatments. Alternative 1 would produce early-seral communities with uniform spacing and size. Alternative 2 would be predominantly small harvest units or areas of wildfire that would be salvage-logged and planted. Depending on the local priorities and degree of ecological emphasis, Alternative 3 would result in patterns with moderate similarity to the native regime. Alternative 5 would be more similar to Alternative 1 in the higher production areas, and to Alternative 3 in other areas. Alternative 7 would have structures similar to Alternative 3 in the non-reserve areas, and to wildfire-created structures in the reserve areas.

Fire, Disturbances, and Treatment: The current early-seral that was created in the cold forest is often in the wrong spatial location for the fire regime. Historically, this type occurred on the steeper landforms where climate and topography supported a crown fire regime that cycled mid-seral communities. Past wildfire and harvesting patterns have typically created these types on foot slopes, benches, ridge tops, or in riparian areas where the historical fire regime was an underburning or mixed fire regime that maintained late-seral stages.

Harvest units and prescribed fires in Alternatives 1 and 2 would continue harvest in the same pattern as current management. Wildfire in Alternatives 1 and 2 would tend to continue to create this type in the wrong pattern, due to fuel accumulation areas affected by fire exclusion. Harvest units and prescribed fires in Alternatives 4 and 6 would shift patterns to the native regime, except that Alternative 6 would proceed at a slower rate. Alternative 5 would provide little emphasis for shifting patterns of this type due to low economic returns. Alternative 3 would proceed at a very slow rate due to the low local priority typically given to subalpine forests. Alternative 7 would be similar to Alternative 3 in the non-reserve areas; but in the reserves have a highly unpredictable response, due to the dynamic nature of wildfires occurring during drought years in the cold forest zone.

Spatial Distribution of Activities: In Alternatives 1 and 2, disturbances and treatments that create this type would generally be scattered throughout all subbasin groups. In Alternatives 4 and 6, the prescribed natural fire program (both planned and unplanned ignition) would play a primary role, with some associated harvest treatments in subbasin group H. The emphasis on this type in the other subbasin groups would not be substantial due to their relatively low compositions of cold forest and also the higher priorities on improving conditions in the dry and moist forest potential vegetation groups.

Mid-seral Subalpine Forest —

Occurrence: Most of this terrestrial community occurs in the cold forest, but some is in the moist forest. Most of this type occurs on BLM- and FS-administered lands. The current level is substantially less than the historical level in the Eastside EIS area, but substantially more than the historical level in the Upper Columbia River Basin EIS area (figs. 2.67 and 2.68).

Response to Alternatives: Figures 2.67 and 2.68 depict the response of this terrestrial community. In the EIS areas, Alternatives 1 and 2 would have moderate increases and then level out between 50 and 100 years, and Alternatives 3 through 6 would have small increases over the 100-year period for the Eastside EIS area.

In the Upper Columbia River Basin EIS area, Alternatives 1 and 2 would have moderate increases, then decline between 50 and 100 years to slightly below the historical level. Alternatives 3

through 6 would have strong declines to well below the historical level by the 100-year period.

In both EIS areas, Alternative 7 would be similar to Alternative 3 on the non-reserve areas. Wildfire would be the primary disturbance on this type in Alternative 7, where the response in the reserve areas would be fairly unpredictable given the dynamic nature of large wildfires in the cold forest.

Community Transition: From the historical to the current period, this type primarily transitioned to: 1) early-seral forests as a result of harvest in spruce and the mortality of whitebark pine from blister rust; 2) dominance by shade-tolerant, montane, mid-seral trees; and 3) mid-seral subalpine forests dominated by more shade-tolerant species, such as subalpine fir and mountain hemlock. There was little net change from these mid-seral forests to late-seral forests.

This stage is generally found on the steeper slopes; these areas usually cycle with a crown fire. The cold forest's mid-seral stage typically remains in that structure if fire does not occur, but becomes more dense. Stress, insects, disease, or fire eventually produce mortality of the overstory and cycle the structure to early-seral.

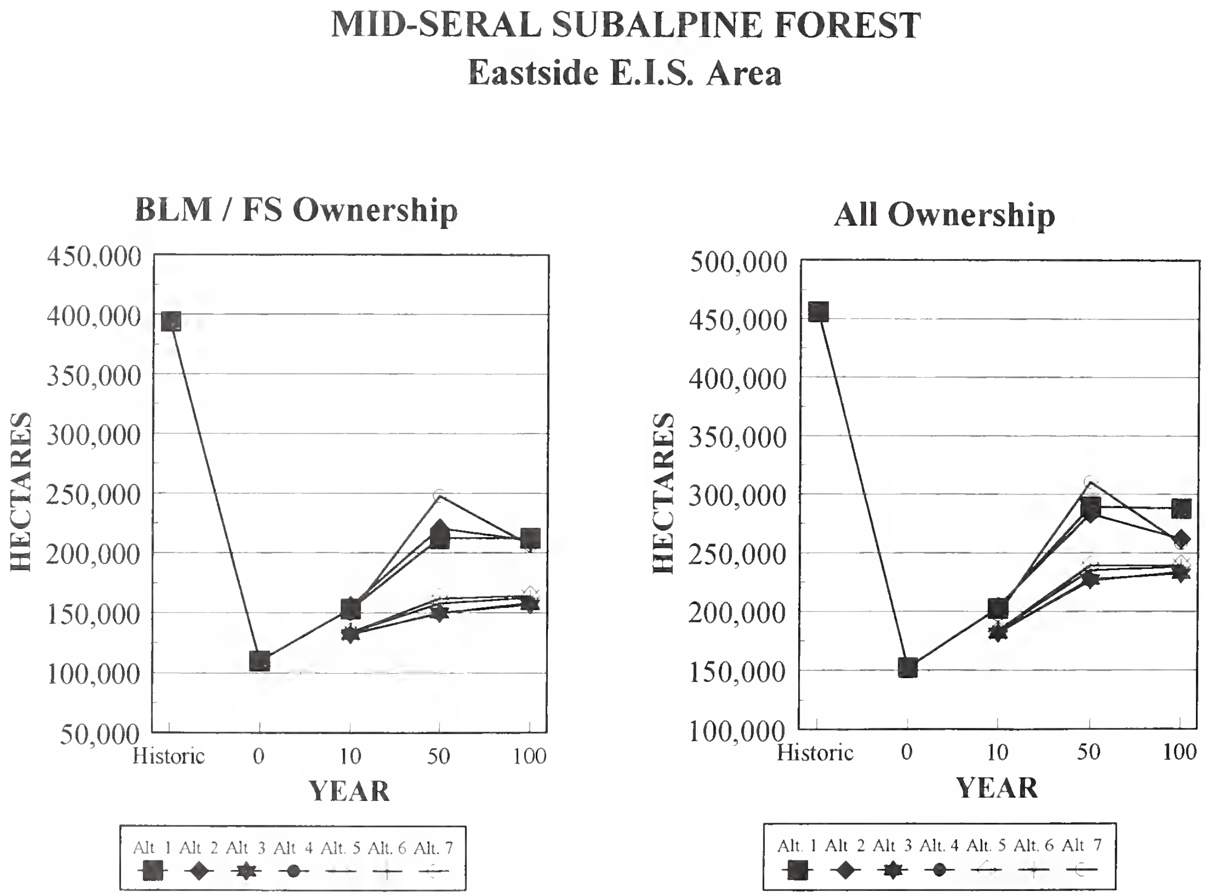


Figure 2.67 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the mid-seral subalpine forest for the Eastside EIS area.

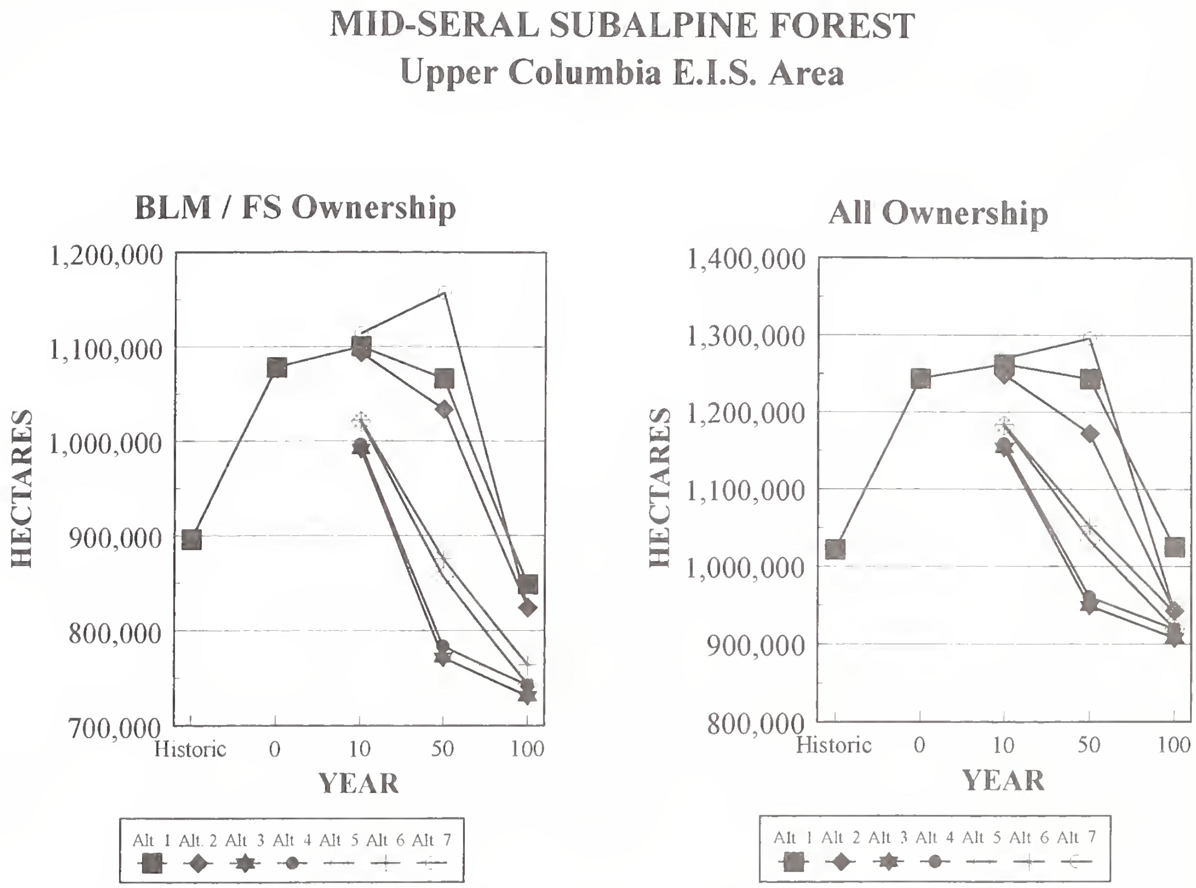


Figure 2.68 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the mid-seral subalpine forest for the Upper Columbia River Basin EIS area.

Alternatives 1 and 2 would continue the transition of early- and late-seral forest to mid-seral forest, while also maintaining much of the mid-seral forest in the mid-seral stage. Although there would not be a substantial difference in response between alternatives, Alternatives 1, 2, and 7 would generally produce higher overall amounts of this stage than Alternatives 3 through 6.

Composition and Structure: The composition and structure of these mid-seral communities would be closest to the native regime in Alternatives 4 and 6 because they emphasize mimicking ecosystem processes. Alternative 1 would produce relatively uniform patch patterns. Alternative 2 would produce stands of high density and small dead-standing and down trees. Depending on the local priorities and degree of ecological emphasis, Alternative 3 would produce structures having moderate similarity to the native regime. Alternative 5 would have little emphasis in the cold forest zone. Alternative 7 would have structures similar to Alternative 3 in the non-reserve areas. Although the response in the reserve areas under Alternative 7 over the long term may tend to be similar to historical structures, the dynamic nature of wildfire in the cold forest zone may preclude development of native patterns.

Fire, Disturbances, and Treatment: Continued traditional harvest and fire exclusion in Alternatives 1 and 2 would increase the amount of this structure that is out of proportion with its native disturbance regime. Thinning, harvesting, and prescribed fire in Alternatives 4 and 6 would shift patterns to the native succession/disturbance regime, although Alternative 6 would proceed at a slower rate. Alternative 5 would have little emphasis on shifting patterns of this type, given its economic priority limitations. Alternative 3 would proceed at varying rates due to its local emphasis. Alternative 7 would be similar to Alternative 3 in the non-reserve areas; in the reserve areas, the patterns are expected to eventually stabilize, but not within the 100-year period.

Spatial Distribution of Activities: In Alternatives 1 and 2, disturbances and treatments that affect this type would generally be scattered throughout all subbasin groups. In Alternatives 4 and 6, the prescribed natural fire program (both planned and unplanned ignition) would play a primary role, with some associated harvest, thinning, and prescribed fire treatments in subbasin group H. No substantial emphasis would be placed on this type in the other subbasin groups due to priorities for improving conditions in the dry and moist forest potential vegetation groups.

Late-seral Multi-layer Subalpine Forest —

Occurrence: Most of this terrestrial community is in the cold forest, although some can occur in the moist forest. Also, most of this type occurs on BLM- and FS-administered lands. Its current level is substantially below its historical level (figs. 2.69 and 2.70).

Response to Alternatives: Figures 2.69 and 2.70 depict the response of this terrestrial community. All alternatives would show an increase of this community to its historical level within 50 years of implementation due primarily to successional development of mid-seral communities. Alternatives 1 and 2 would continue with a steady increase above the historical level by year 100. For the EEIS area, Alternatives 3 through 6 would increase to the historical level by year 50 and level out at that level through year 100. For the UCRB the amounts would continue to increase. Alternative 7 would be similar to Alternative 3 on the non-reserve areas. Wildfire would be the primary effect on late-seral subalpine in Alternative 7, where the response in the reserve areas would be fairly unpredictable given the dynamic nature of large wildfires in the cold forest potential vegetation group.

Community Transition: From the historical to current period, this type primarily transitioned from early-seral forests to dominance by shade-tolerant montane mid-seral or late-seral trees. This transition was a result of fire, harvest in spruce, and mortality of whitebark pine from blister rust. In the native regime, the late-seral multi-layer stage is generally found on the foot slopes, riparian areas, and benches, with a mixed or creeping/spotting type of fire regime. If disturbance does not occur, the late-seral multi-layer stage of the cold forest typically stays in that structure but becomes more dense. In the native regime, mixed or creeping/spotting type fires thinned the stands and selected against shade-tolerant species. Without these kinds of disturbances, however, stress, insects, disease, or crown fire eventually produce mortality of the overstory and cycle the structure to mid- or early-seral. Much of the cold forest's current late-seral multi-layer is found on the steeper slopes where there is high risk for crown fires.

Fire, Disturbance, and Treatments: Traditional harvest and fire exclusion patterns in Alternatives 1 and 2 would increase the amount of this structure that is out of balance with its basic disturbance regime, particularly in the 50- to 100-year period. Thinning, harvest units, and prescribed fires in Alternatives 4 and 6 would shift patterns to the native succession/disturbance regime, but Alternative 6 would proceed at a slower rate. Alternative 5 would have little emphasis on shifting patterns of late-seral multi-layer subalpine, given its economic priorities. Alternative 3 would proceed at a moderate level, due to its local emphasis. Alternative 7 would be similar to Alternative 3 in the non-reserve areas; the patterns in the reserves are expected to eventually stabilize, but not within the 100-year period.

LATE-SERAL SUBALPINE FOREST MULTI-LAYER
Eastside E.I.S. Area

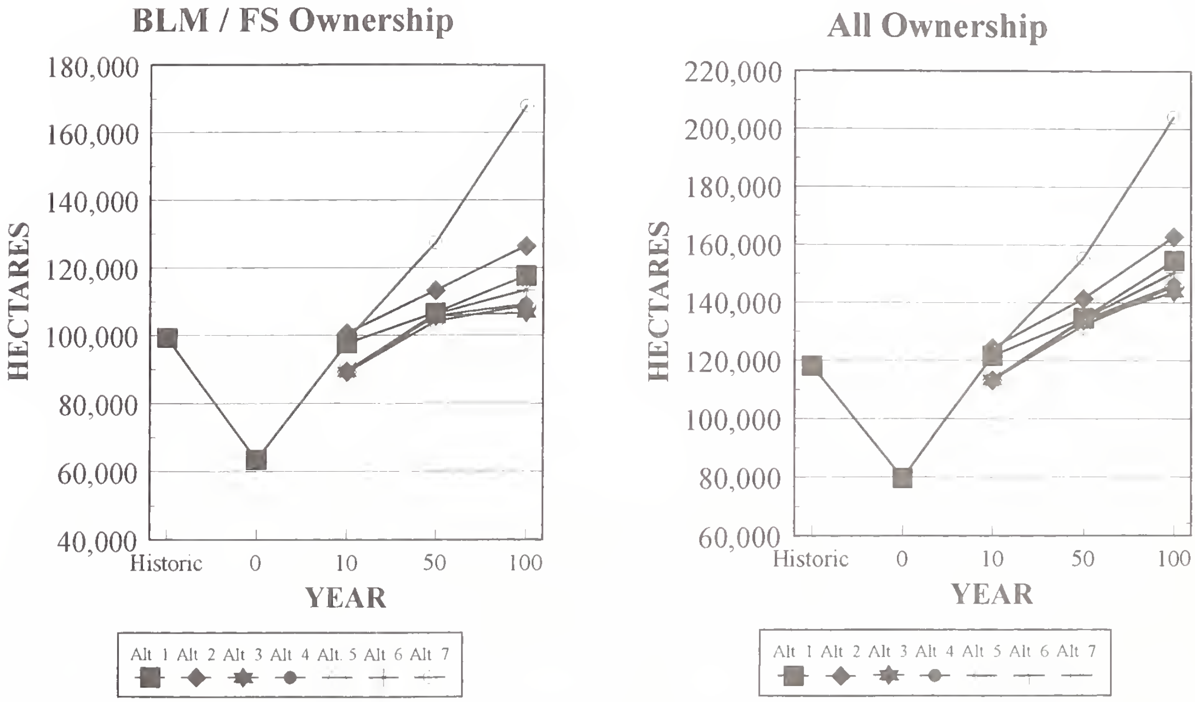
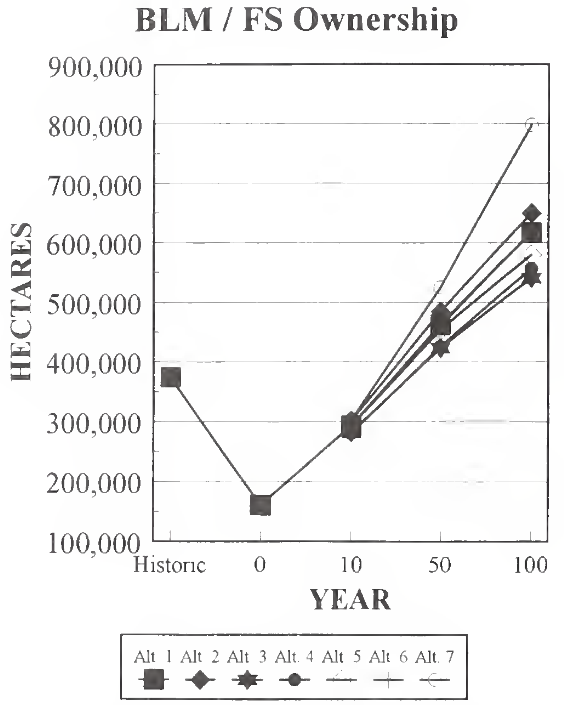


Figure 2.69 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the late-seral subalpine forest multi-layer for the Eastside EIS area.

Composition and Structure: In general, the composition and structure of these late-seral multi-layer communities would be closest to the native regime in Alternatives 4 and 6, because they emphasize mimicking ecosystem processes. Alternative 1 would produce relatively uniform patterns. Alternative 2 would produce stands of higher densities and more small dead standing and down trees. Depending on local priorities and degree of ecological emphasis, Alternative 3 would have moderate similarity to the native regime. Alternative 5 would have little emphasis in this zone. Alternative 7 would have structures similar to Alternative 3 in the non-reserve areas; the response of structures in the reserve areas would tend to be similar to current structures. However, the potential dynamics of wildfire in Alternative 7 may preclude development of mid-seral structures.

Spatial Distribution of Activities: In Alternatives 1 and 2, disturbances and treatments affecting the subalpine forests would generally be scattered throughout all subbasin groups. In Alternatives 4 and 6, the prescribed natural fire program (both planned and unplanned ignition) would play a primary role, with some associated harvest, thinning, and prescribed fire treatments in subbasin group H. Emphasis on this type in other subbasin groups would not be substantial due to priorities for improving conditions in other potential vegetation groups.

LATE-SERAL SUBALPINE FOREST MULTI-LAYER
Upper Columbia E.I.S. Area



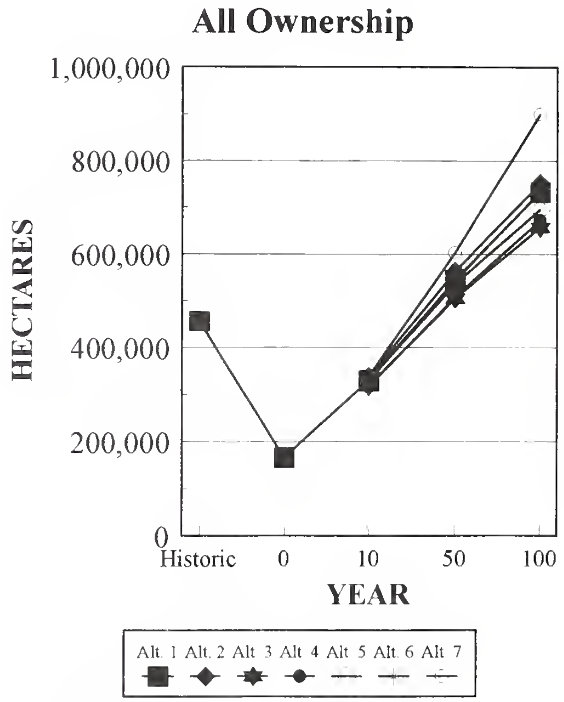


Figure 2.70 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the late-seral subalpine forest multi-layer for the Upper Columbia River Basin EIS area.

Late-seral Single-layer Subalpine Forest —

Occurrence: Most of this terrestrial community is in the cold forest, although some can occur in the moist forest. Also, most of this type occurs on BLM- and FS-administered lands. Its current level is below the historical level for the Eastside EIS area and above for the Upper Columbia River Basin EIS area (figs. 2.71 and 2.72).

Response to Alternatives: Figures 2.71 and 2.72 depict the response of this community. All alternatives would have a continued, steep decline from the current level due to a lack of technology to restore whitebark pine and provide for underburning and mixed regime fires that would maintain this type.

The ecological placement of this type is typically on ridges and benches in the cold forest at high elevations, mostly in wilderness and semi-primitive areas. The predominance of prescribed natural fire and unplanned ignition in areas that now have high fuel loading would preclude this type of fire behavior in most fire years. No alternatives would successfully address this situation. Alternative 6, which has higher potential than the other alternatives for technology development may result in higher levels of prescribed natural fire and planned ignition in these ecosystems.

Community Transition: From the historical to current period, this type primarily transitioned to:

1) early-seral forests, as a result of fire, harvest in spruce, and mortality of whitebark pine from blister rust; and 2) dominance by shade-tolerant, mid-seral montane trees, such as lodgepole pine. This stage is generally found on ridge tops and benches, which historically had underburning or mixed type fire regime. These types of fire thinned the stands, selected against shade-tolerant species, and maintained herb- and shrub-dominated understories. The late-seral stage typically loses its overstory due to stress, insects, disease, or crown fire. Most of the cold forest's current late-seral single-layer community still remains in its ecologically appropriate landform.

Fire, Disturbances, and Treatments: Fire exclusion and traditional harvest patterns in Alternatives 1 and 2 would increase the amount of this structure that is inconsistent with the biophysical regime. The restoration alternatives (3 through 6) do not appear to take substantial action for planned ignitions of prescribed natural fires during conducive weather conditions to provide for the native succession/disturbance regime. The non-reserve areas of Alternative 7 would be similar to Alternative 3; reserve areas would have highly unpredictable patterns due to wildfire's dynamic nature in the cold forest zone.

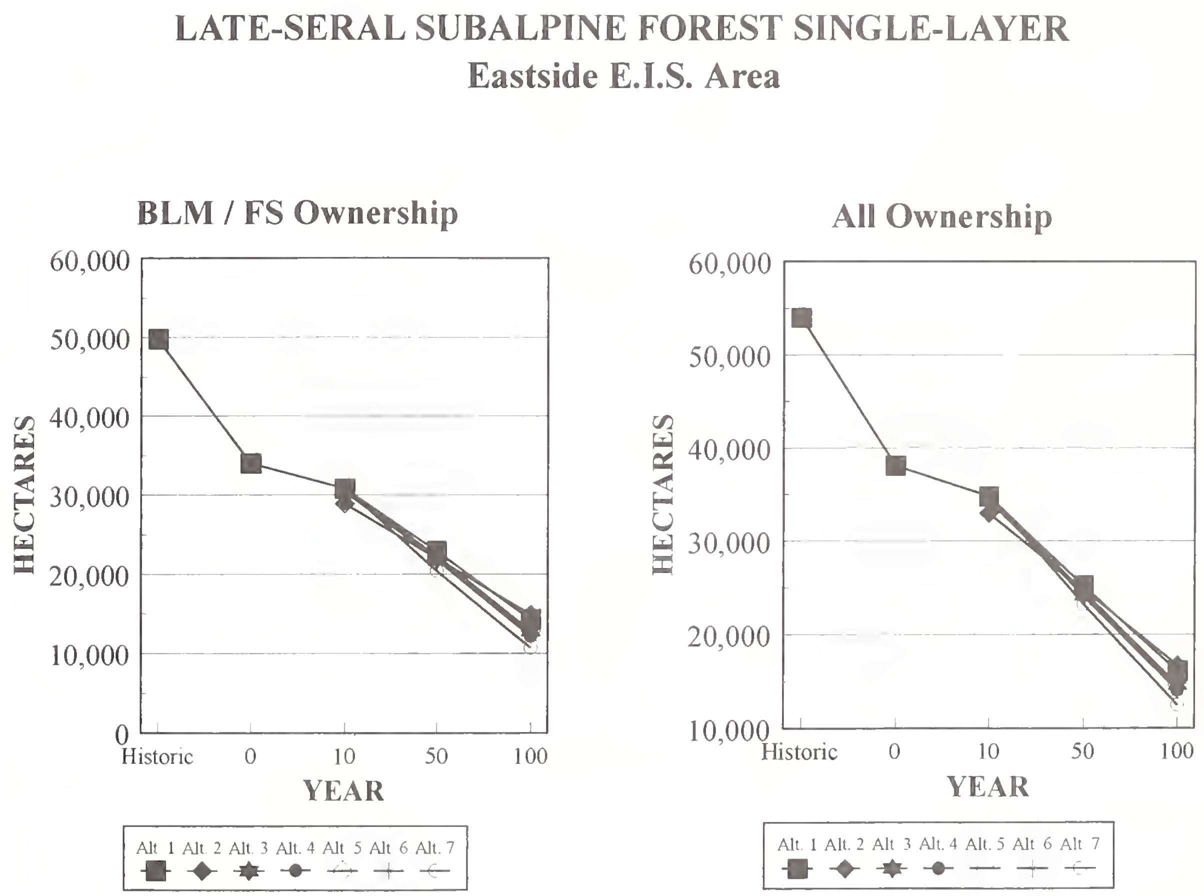


Figure 2.71 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the late-seral subalpine forest single-layer for the Eastside EIS area.

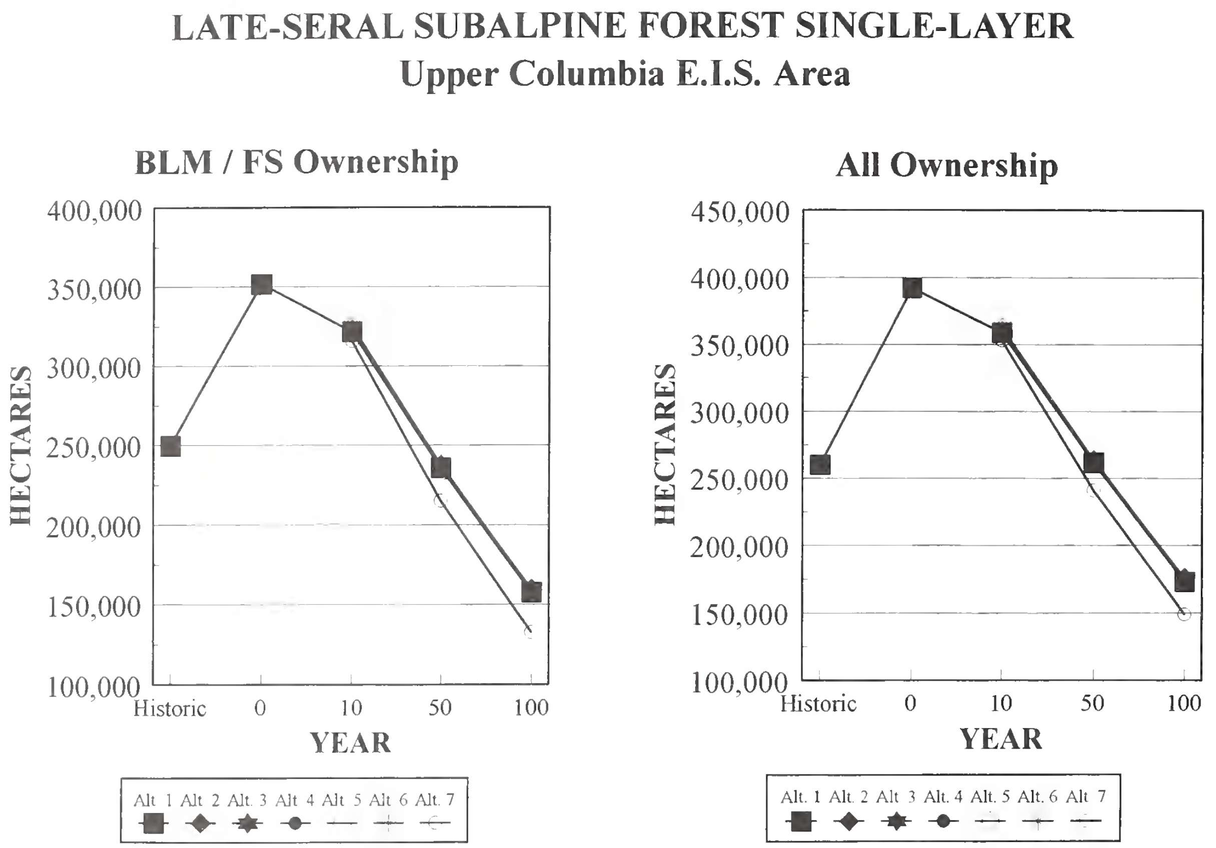


Figure 2.72 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the late-seral subalpine forest single-layer for the Upper Columbia River Basin EIS area.

Community Structure: In general, if there were aggressive management actions, the composition and structure of these late-seral single-layer communities would be closest to the native regime in Alternatives 4 and 6, which place emphasis on mimicking ecosystem processes. Other alternatives would generally affect the structure and pattern of this type negatively, due to inappropriate ecological treatments in Alternatives 1 and 2, and the lack of ecological emphasis in Alternatives 3, 5, and 7.

Spatial Distribution of Activities: In Alternatives 1 and 2, disturbances and treatments affecting late-seral single-layer subalpine forest would generally be scattered throughout all subbasins. In Alternatives 4 and 6, the prescribed natural fire program (both planned and unplanned ignition) may play a role, with some associated harvest, thinning, and prescribed fire treatments in subbasin group H. The other subbasin groups would not emphasize this type, due to their low priority for the zone.

Rangeland Potential Vegetation Groups

The rangeland potential vegetation groups include:

- Dry shrub
- Dry grass
- Cool shrub
- Woodland

In the Eastside EIS area, there are 11,768,500 hectares (29,080,600 acres) of the rangeland potential vegetation groups on BLM- and FS-administered lands:

4,348,700 hectares (10,745,873 acres), or 37.0 percent, in dry shrub

319,300 hectares (789,008 acres), or 2.7 percent, in dry grass

899,200 hectares (2,221,972 acres), or 7.6 percent, in cool shrub

62,300 hectares (153,947 acres), or 0.5 percent, in woodland

In the Upper Columbia River Basin EIS area, there are 18,492,800 hectares (45,696,709 acres) of the rangeland potential vegetation groups in BLM- and FS-administered lands:[1]

3,737,500 hectares (9,235,565 acres), or 20.2 percent, in dry shrub

666,300 hectares (1,646,463 acres), or 3.6 percent, in dry grass

[1]Note: the GYE is incorporated in the UCRB EIS area numbers.

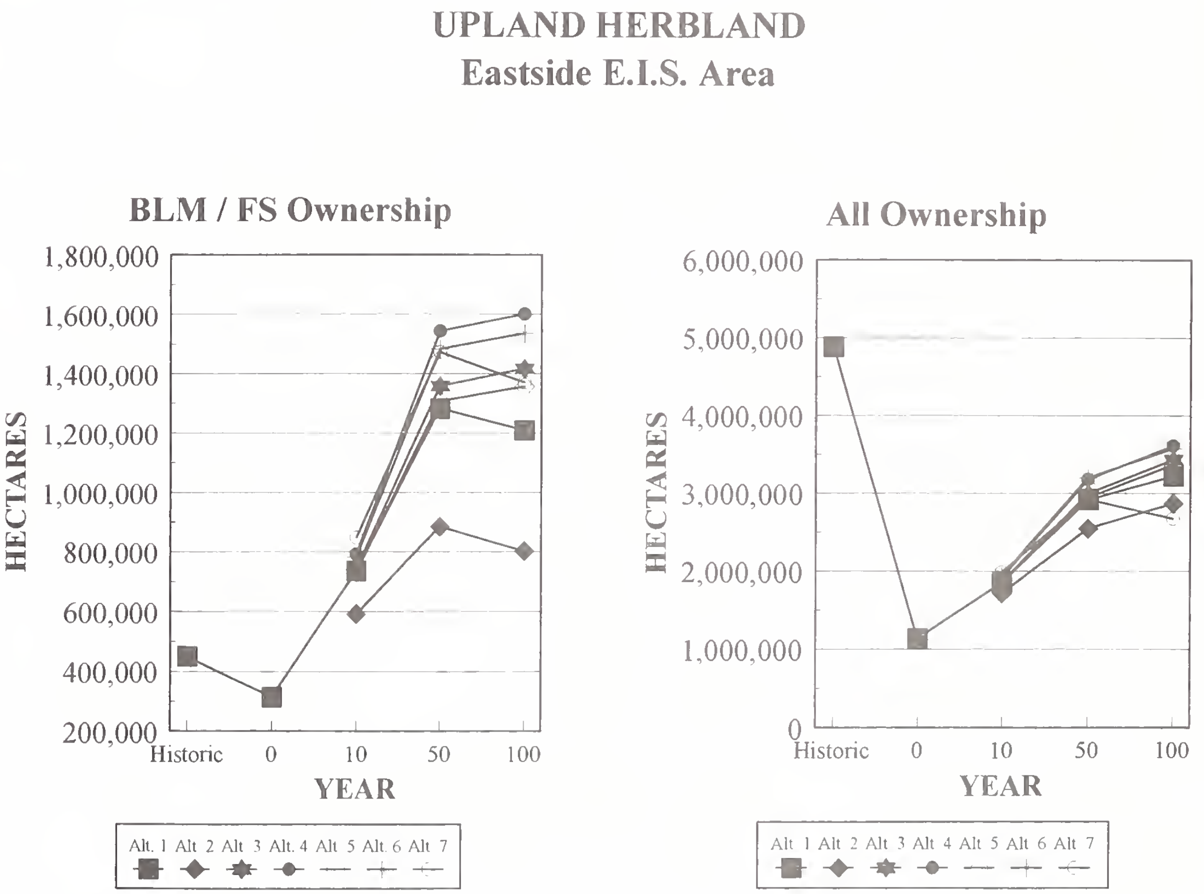


Figure 2.73 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the upland herbland for the Eastside EIS area.

1,973,300 hectares (4,876,131 acres), or 10.7 percent, in cool shrub

97,100 hectares (239,939 acres), or 0.5 percent, in woodland

Upland Herbland —

Occurrence: This terrestrial community is common in all rangeland potential vegetation groups and also in the dry forest potential vegetation group. A shortage of upland herbland was identified as a finding of concern in the landscape assessment (Hann and others, in press). The current level is only about half the historical level for both EIS areas (figs. 2.73 and 2.74). From the historical to current period, there was little upland herbland created, except where minor fire and seeding disturbance occurred in the upland shrublands and woodlands, and in the dry forest.

Response to Alternatives: Figures 2.73 and 2.74 depict the response of the upland herb community. All alternatives would increase the amount of upland herbland as a result of fire and restoration. The trend would be a steep increase in the first 50 years, then a leveling or decline due to succession.

The restoration alternatives (3 through 6) would provide for the most increase of upland herb in the Eastside EIS area; Alternative 1 would have an intermediate increase; and Alternative 2 would have the lowest increase. Alternative 7 is less than

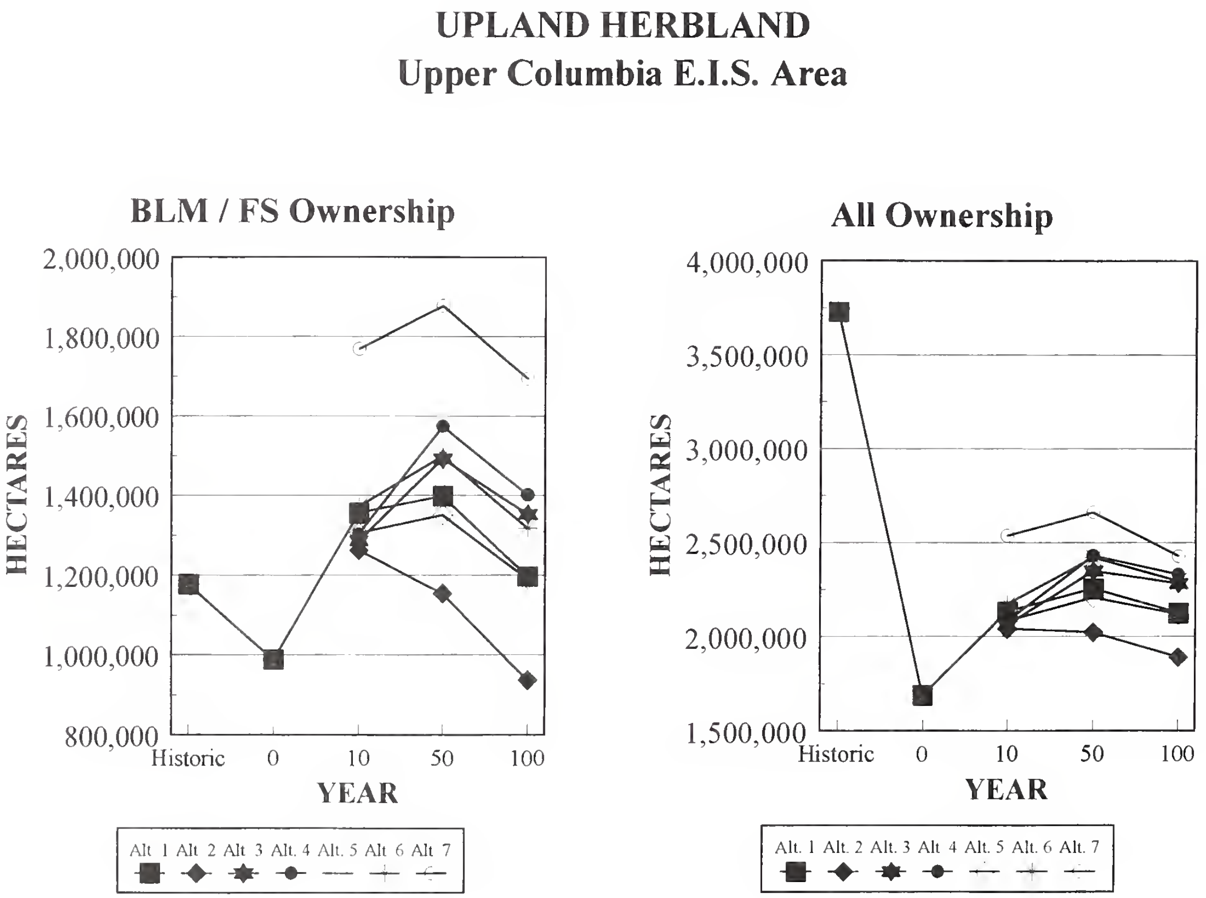


Figure 2.74 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the upland herbland for the Upper Columbia River Basin EIS area.

Alternative 6 and greater than Alternative 3. However, fires may burn with a high severity that increases risk of exotic herb invasion in Alternative 7. Alternative 7 would have the largest increase in the UCRB due to wildfire. Other trends are similar to the Eastside EIS area.

Fire, Disturbances, and Treatments: Much of the historical upland herbland developed into upland shrubland, upland woodland, or early/mid-seral forest as a result of fire exclusion.

Community Composition and Structure: In general, the upland herbland communities would be closest to the native composition and structure in Alternatives 4 and 6, due to their emphasis on mimicking ecosystem processes with prescribed fire, grazing, and restoration treatments. Alternative 1, and the upland areas of Alternative 2, would produce structures trending toward simplification and monocultures. Depending on the local priorities and degree of ecological emphasis, Alternative 3 would produce structures with moderate similarity to the native regime. Alternative 5 would be similar to Alternative 1 in the higher production areas, and to Alternative 3 in other areas. Alternative 7 would have structures similar to Alternative 3 in the non-reserve areas, and to wildfire-created structures in the reserve areas.

Spatial Distribution of Activities: In Alternatives 1 and 2, disturbances and treatments affecting this

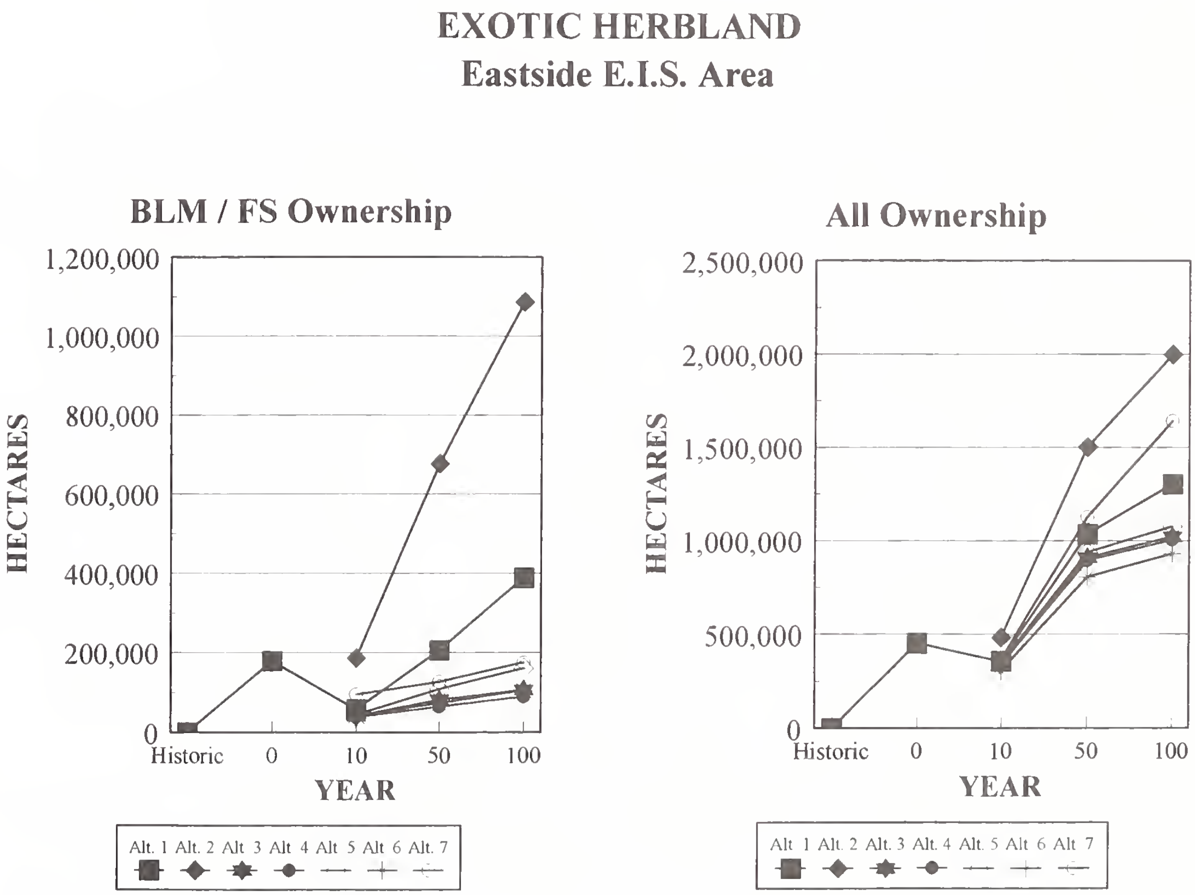


Figure 2.75 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the exotic herbland for the Eastside EIS area.

type would generally be scattered throughout all the subbasin groups. In Alternatives 4 and 6, the prescribed natural fire program (both planned and unplanned ignition) would play a primary role, with some associated restoration treatments in subbasin group H; moderate emphasis on prescribed fire and restoration treatments prioritized in group F; moderate emphasis on prescribed fire and restoration treatments in groups J and L; and a moderate emphasis in group M. In Alternative 3, the focus for prescribed fire and restoration treatments would be in groups L and M. In Alternative 5, the focus would be in groups L and M.

Exotic Herbland —

Occurrence: The exotic herbland community is common in all rangeland potential vegetation groups and in the dry forest. Ecological concerns about exotic plants were discussed in the Landscape Dynamics assessment (Hann and others, in press). The current level of exotic plant introduction and spread is substantially above historical levels (figs. 2.75 and 2.76).

Response to Alternatives: Figures 2.75 and 2.76 depict the response of this terrestrial community. In these two figures, the current level is higher than the 10-year level because a different version

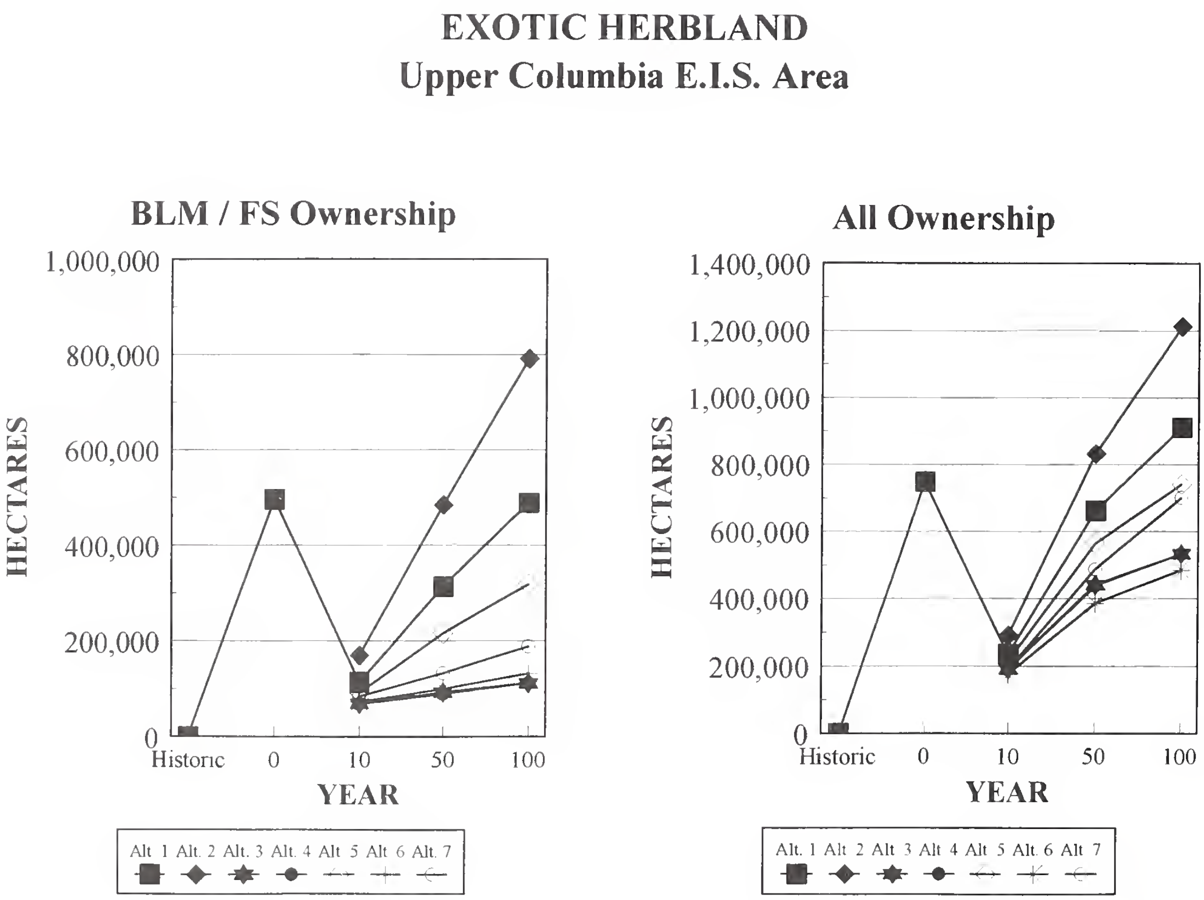


Figure 2.76 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the exotic herbland for the Upper Columbia River Basin EIS area.

of the broad-scale vegetation cover type map was used, which showed less exotic herblands in the current condition.

Due to these mapping difficulties with exotic herblands, we are uncertain about their predicted responses at the EIS assessment area, potential vegetation group, ecological reporting unit, and subbasin group levels. In general, because of coarse-scale mapping and prescription models being mapped at the forest and range cluster level, rather than the subbasin or potential vegetation group level, the current amounts of exotic herbs and their potential rates of spread may be underestimated. The projected integrated weed management programs may not be aggressive enough to achieve the desired futures. Therefore, the predictions should be used only as an index. The trends and relative differences discussed between alternatives, however, have moderately high confidence.

Alternative 1 would have the greatest increase in exotic herbland because the forest and resource plans have high levels of disturbance and little emphasis on weed management. This increase in exotic herbland communities in Alternative 1 would result in ecological simplification and monocultures. Alternative 2 would be similar to Alternative 1 for upland areas, but overall would

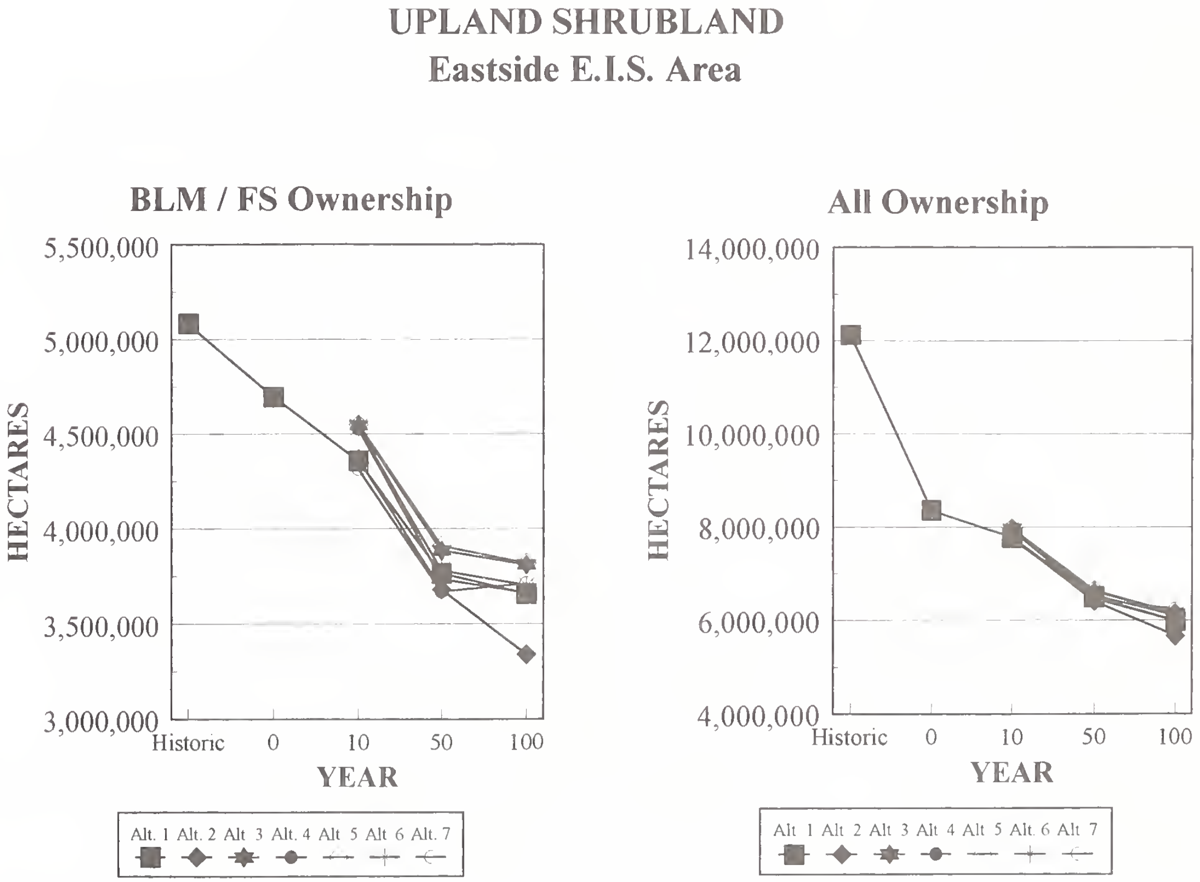


Figure 2.77 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the upland shrubland for the Eastside EIS area.

have reduced amounts of exotic herbs due to lower levels of disturbance. The more aggressive integrated weed management efforts on containment and control in Alternatives 3 through 6 would maintain exotic herblands at their present level. Of these, Alternative 3 would have an emphasis level resulting in a more fragmented approach, and Alternative 5 would tend to emphasize areas where weed management resulted in economic efficiency. The response of exotic herblands in Alternative 7 would be similar to Alternative 3 in the non-reserve areas, but relatively unpredictable in the reserve areas.

Community Transition: From the historical to current period, the introduction and spread of exotic herbs have been substantial, particularly in dry forest, dry shrub, and dry grassland communities; and along roadsides and stream/river corridors. The composition and structure of most exotic herbland communities is not similar to native communities.

<u>Upland Shrubland</u> —

Occurrence: Although upland shrub is common in all rangeland potential vegetation groups and also in the dry forest, its current amount is below its historical level (figs. 2.77 and 2.78). The shortage of upland shrubland was a finding of concern in the Landscape Dynamics assessment (Hann and others, in press).

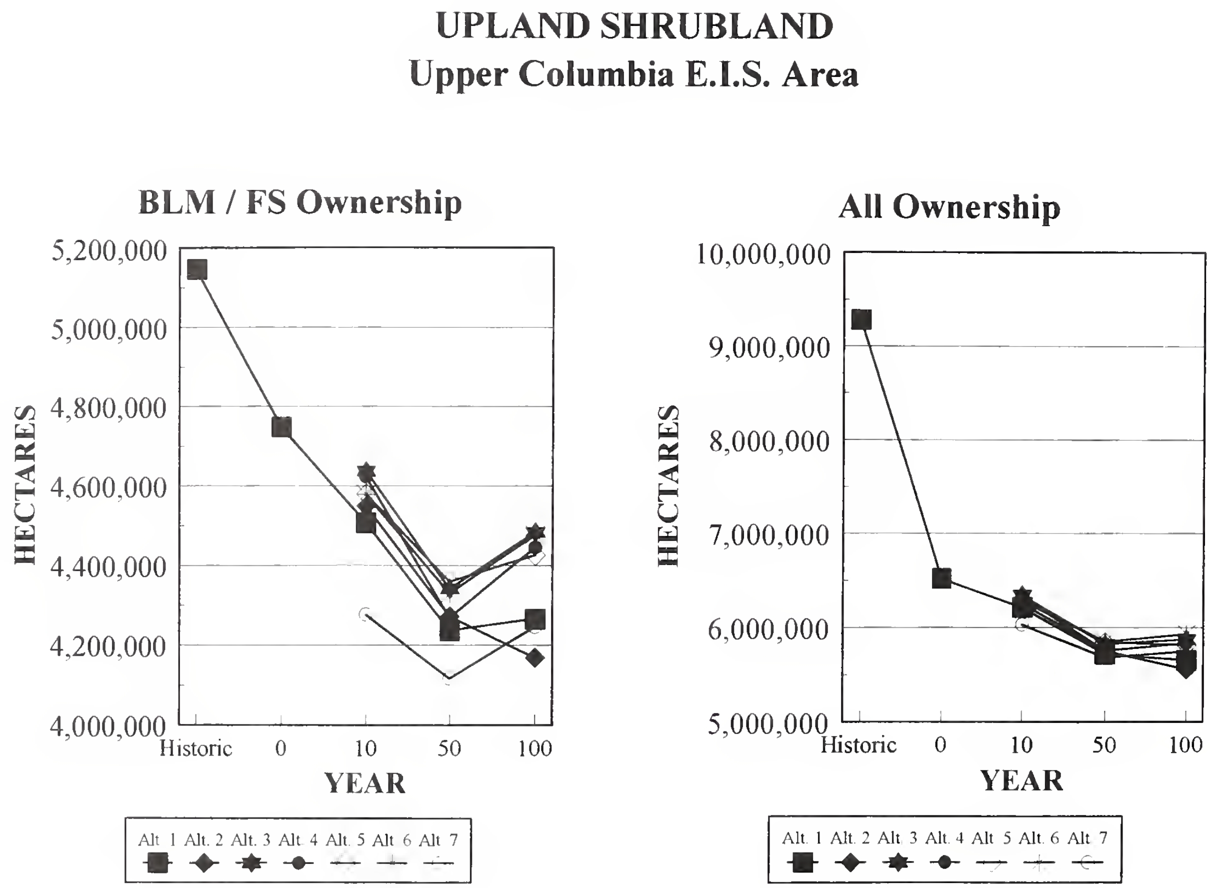


Figure 2.78 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the upland shrubland for the Upper Columbia River Basin EIS area.

Response to Alternatives: Figures 2.77 and 2.78 depict the response of the upland shrub community. All alternatives would result in the continued decline of this type due to succession to woodland and conifer encroachment, exotic herb invasion, fire exclusion in some areas, and increased fire in other areas.

The restoration emphasis alternatives (3 through 6) would provide for a leveling of the decline at about year 50. Alternatives 1 and 2 would have a continued decline through year 100. Although not graphed, Alternative 7 would be between Alternatives 3 and 2.

Composition and Structure: In general, the composition and structure of the upland shrubland communities would be closest to the native regime in Alternatives 4 and 6, which emphasize mimicking ecosystem processes with prescribed fire, grazing, and restoration treatments. Alternative 1 would produce dense, uniform upland shrubland or woodland/forest encroachment communities, or conversion to exotic herbland; Alternative 2 would be similar to Alternative 1. Depending on the local priority and degree of emphasis, Alternative 3 would result in structures with moderate similarity to the native regime. Alternative 5 would be similar to Alternative 1 in the higher production areas, and to Alternative 3 in other areas. Alternative 7 would have structures similar to Alternative 3 in the non-reserves and relatively unpredictable patterns in the reserves as a result of wildfire.

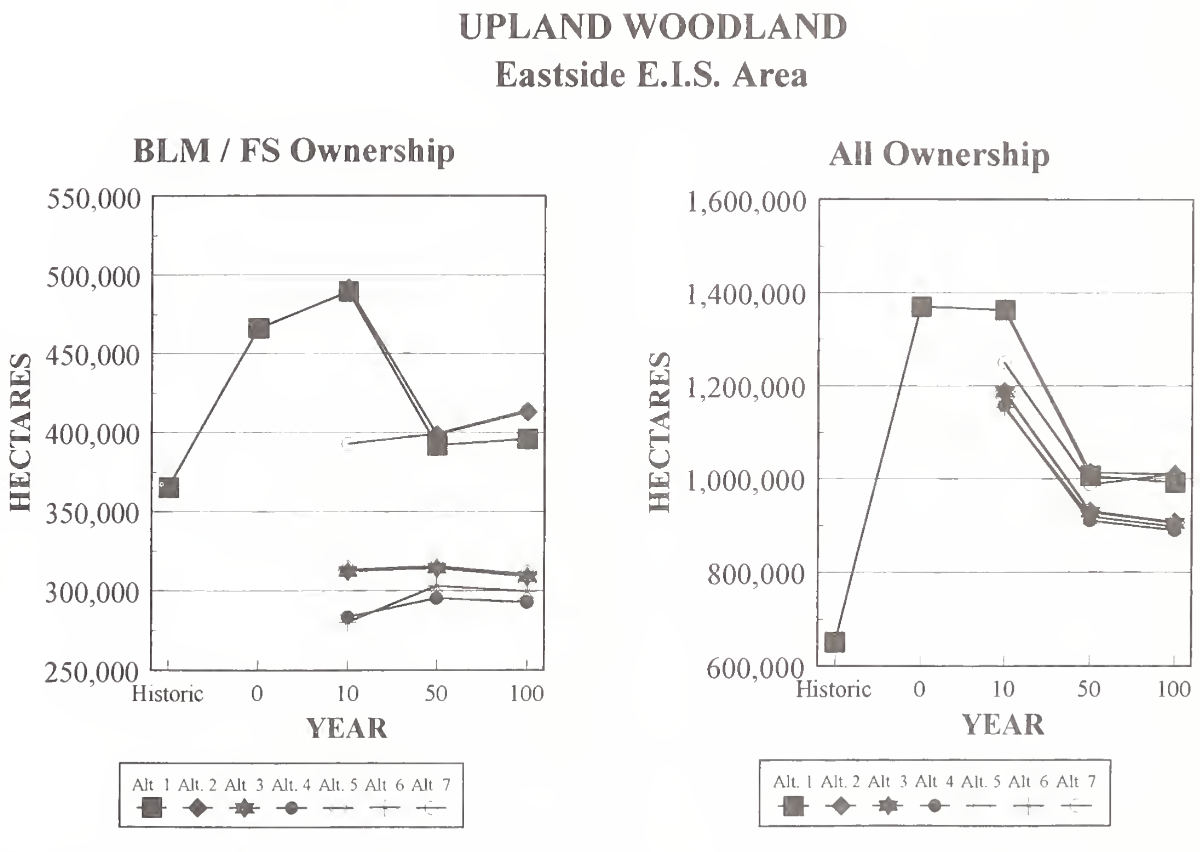


Figure 2.79 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the upland woodland for the Eastside EIS area.

Spatial Distribution of Activities: In Alternatives 1 and 2, disturbances and treatments that produce this type through succession from upland herbland would generally be scattered throughout all the subbasin groups. In Alternatives 4 and 6, the prescribed natural fire program (both planned and unplanned ignition) would play a primary role, with some associated restoration treatments in subbasin group H. Prescribed fire and restoration treatments would have moderate emphasis in group F, J, L, and M. In Alternatives 3 and 5, the focus for prescribed fire and restoration treatments would be in groups L and M.

Upland Woodland —

Occurrence: This terrestrial community is common in all rangeland potential vegetation groups. The high amount of upland woodland communities compared to historical conditions in the Eastside EIS area was a finding of concern in the Landscape Dynamics assessment (Hann and others, in press). Its current amount is substantially above the historical level in the Eastside EIS area, but substantially below the historical level in the Upper Columbia River Basin EIS area.

Response to Alternatives: Figures 2.79 and 2.80 depict the response of this terrestrial community. In the Eastside EIS area, all alternatives would reduce the upland woodland. Alternatives 1 and 2 would generally level out from the 50- to 100-year period at the historical level. The restoration emphasis Alternatives (3 through 6) would provide for a leveling at about year 50. Alternatives 1

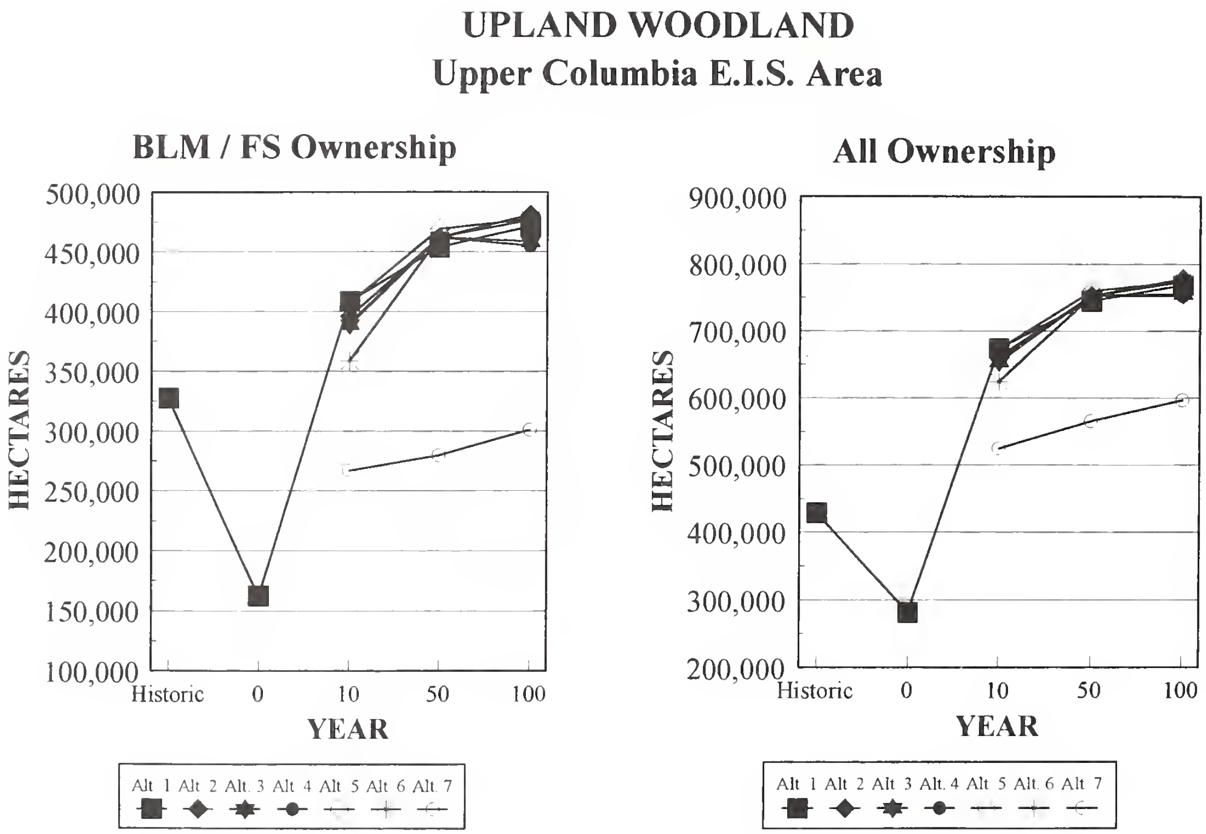


Figure 2.80 — Trends from historic to current and future (100 year) projections for preliminary draft EIS alternatives 1 through 7 for the upland woodland for the Upper Columbia River Basin EIS area.

and 2 would generally show a reduction to below the historical level. Alternative 7 would result in amounts between Alternatives 2 and 3. In the Upper Columbia River Basin EIS area, all alternatives would result in increases well above the community's historical levels except for Alternative 7.

Composition and Structure: In general, the composition and structure of the upland woodland communities would be closest to the native regime in Alternatives 4 and 6, because of their emphasis on mimicking ecosystem processes with prescribed fire, grazing, and restoration treatments. Alternatives 1 and 2 would produce similar upland woodland communities which would tend to be dense and uniform. Depending on the local priorities and degree of ecological emphasis, Alternative 3 would have structures with moderate similarity to the native regime. Alternative 5 would be similar to Alternative 1 in the higher production areas, and to Alternative 3 in other areas. Alternative 7 would have structures similar to Alternative 3 in the non-reserve areas and similar to current structures in reserve areas.

Spatial Distribution of Activities: In Alternatives 1 and 2, disturbances and treatments that produce the upland woodland through succession from upland herbland would generally be scattered throughout all subbasin groups. In Alternatives 3 through 6, the general emphasis for management of upland woodlands would be in subbasin group L; and in Alternative 7, it would be in the non-reserve portions of group L.

Rangeland Riparian —

Occurrence: In the prescription mapping process, Alternatives were mapped at the upland forest and rangeland potential vegetation group level, not at the riparian level. Current broad-scale mapping of riparian areas generally overemphasize the large polygons of riparian and underemphasize the narrow riparian areas. Because of this mapping, the modeled projections were not specific to riparian. The predictions should be used with caution and only to indicate trends.

Alpine —

Occurrence: The alpine potential vegetation group is very important as a sensitive ecological environment.

Response to Alternatives: All alternatives place emphasis on restoration in the alpine potential vegetation group.

Fire, Disturbances, and Treatments: Activities such as mining, roading, livestock grazing, and recreational activities have caused declining ecological conditions in alpine communities. Also, the alpine community is the most sensitive of all potential vegetation groups to toxic air pollutants.

Composition and Structure: Because of the relatively-broad classification used in our modeling, none of the alternatives showed any structural or composition changes in this potential vegetation group.

There is little guidance provided in the preliminary draft EIS Chapter 3 relative to management or restoration of the alpine system. However, based on the themes and DFCs, we assume the emphasis for restoration would be high in Alternative 4 and 6 because of their emphases. Given the sensitive nature of these environments, their future trend would likely decline in other alternatives. The decline would be somewhat less in Alternatives 3, 5, and 7, than in Alternatives 1 and 2.

Summary

We would recommend that any future analysis of broad-scale communities as terrestrial habitats use the physiognomic type groups (PVTs) stratified by potential vegetation group (PVG) or, for a coarser grouping, by forest and rangeland. The changing nature of lower montane, montane, subalpine and non-forest terrestrial communities in relation to existing vegetation cover types with no tie to the biophysical environment is a substantial hindrance to this analysis. Without the tie to the biophysical environment little inference can be made relative to temperature, moisture, soils, terrain, or consistency of the terrestrial communities with the biophysical system and inherent succession and disturbance processes.

Effects of Alternatives on Selected Noxious Weeds and Cheatgrass on Rangeland

Invasions of exotic plants have been numerous in the Basin in the last 100 years (Young and others 1972, Franklin and Dryness 1973, Yensen 1981, in: Mack 1986). On the Basin's rangeland, exotic plants, especially the legally declared "noxious" weeds, and cheatgrass are spreading rapidly and in some cases exponentially. Their establishment and spread is aided by disturbance to the soil surface in combination with their opportunistic life cycle strategies.

The establishment and spread of noxious weeds and cheatgrass is of concern because of their adverse effects on rangeland health, which include:

- Reduction of the diversity and abundance of native vegetation.
- Reduction of forage for livestock and wildlife.
- Reduction in the diversity and quality of wildlife habitat.
- Increase in erosion and subsequent decrease in water quality and soil productivity.

Although noxious weed establishment and spread is facilitated by soil surface disturbance, some noxious weed species (such as spotted knapweed, yellow starthistle, and leafy spurge) are invading relatively undisturbed sites, including wilderness areas and National Parks (Asher 1994; Tyser and Key 1988).[1]

The extent and effects of noxious weeds and cheatgrass on rangeland health are an issue of critical concern in the Basin, and for this reason are addressed in the preliminary draft EISs and also included in this evaluation of alternatives.

Scientific names of weed species discussed in this evaluation are listed in table 2.41.

Methods Used in Evaluating the Effects of Alternatives on Noxious Weeds and Cheatgrass

The following steps formed the foundation for evaluating the effects of the alternatives on selected noxious weeds and cheatgrass:

- First, the noxious weeds and cheatgrass analyzed in Karl and others (1995) were categorized by range cluster, giving current location within the cluster and any current acreage data, where available (appendix 2L, tables 2L.1 through 2L.6). A list was made of potential vegetation types (PVTs) that had either high or moderate susceptibility to these weeds within the dry grass, dry shrub, and cool shrub potential vegetation groups (PVGs)(appendix 2M, tables 2M.1 through 2M.10).

  A high-susceptibility potential vegetation type is defined as a type where a weed species can invade successfully and become dominant or codominant, even in the absence of intense or frequent disturbance. A moderate-susceptibility potential vegetation type is defined as a type where a weed species can invade successfully because intense or frequent disturbance impacts the soil surface or removes the normal canopy cover.

  See Karl and others (1995) for a table listing the susceptibility ratings for each rangeland potential vegetation type in the Basin to each noxious weed and cheatgrass. Susceptibility ratings of rangeland potential vegetation types were com-

[1]Personal observation. 1996. M.G. Karl. Rangeland Management Specialist - Ecologist. U.S. Department of Agriculture, Forest Service. Interior Columbia Basin Ecosystem Management Project, Walla Walla, Washington.

piled from B. Anderson,[2] Asher (1991, 1993a, 1993b),[3] Brandt and Rickard (1994), Karl and others (1995), Pellant and Hall (1994), Piper and Coombs (1996), Rice and others (1994), Roche (1991, 1994), and USDI (1996). These susceptibility ratings, along with the weed species most prevalent within a PVG and range cluster (appendix 2L, tables 2L.1 through 2L.6) were used to make determinations of the weed species that would be the target of weed control activities. It should be noted that the acreages in appendix 2L are not specific in all cases to BLM- and FS-administered lands, and that the estimate areas in most cases are general. Further refinement may occur after more accurate data is compiled from the various BLM districts and resource areas and the forests and ranger districts in the EIS implementation process.

- Second, the rangeland potential vegetation types in each subbasin (4th-field HUC) within the Basin were summed by range cluster for the BLM- and FS-administered lands and for Other lands (non BLM/FS; incomplete information not presented for all clusters)(appendix 2M, tables 2M.1 through 2M.10). These data were used as background material in determining the extent of moderate and high susceptibility potential vegetation types within each cluster.

- Third, the management activity tables in the preliminary draft EISs for the Eastside and the Upper Columbia River Basin areas were used to provide estimates of acres on which weed control, livestock management, and prescribed burning activities would be implemented for each alternative. Acreage for weed control and livestock management was specified by dry grass, dry shrub, and cool shrub potential vegetation groups for each target range cluster for each alternative (appendix 2N, tables 2N.1 through 2N.6). Tables in appendix 2N also include the steps of Integrated Weed Management (IWM) and affected PVTs. Chapter 3 of the preliminary draft EISs was the origin of the IWM emphasis.

- Fourth, the alternatives described in Chapter 3 of the preliminary draft EISs, including their Integrated Weed Management (IWM) emphasis, were the basis for this evaluation of effects of the alternatives on noxious weeds and cheatgrass. The steps of integrated weed management emphasized in the EISs vary by range cluster, according to the different objectives or emphasis of each alternative. These objectives are either restore, produce, conserve, or various combinations.

The alternatives were ranked for their effectiveness in preventing the spread of noxious weeds and cheatgrass in the dry grass, dry shrub, and cool shrub PVGs. Ranks of effectiveness are presented in tables in the following text. This ranking was done by potential vegetation group and EIS planning area; finer-scale information such as the susceptibility of each weed species to chemical, biological, manual, and mechanical control techniques (Karl and others 1995); and the assumptions listed below.

The overall numerical rank assigned to each alternative for a discussion of effects was computed as the average of the range clusters' ranks.

Assumptions for Rangelands

Rangeland Assumption 1: The basis for the noxious weed and cheatgrass evaluation was the dry grass, dry shrub, and cool shrub potential vegetation groups described in management activity table 3-7 of the preliminary draft EISs. No other potential vegetation groups were included in this evaluation. Although the forest and riparian PVGs were not analyzed, due to lack of time, the information for the cool shrub PVG is somewhat useful as a proxy.

[2]Personal communication. 1995. Bruce Anderson, U.S. Department of Agriculture, Forest Service, Nez Perce National Forest, Salmon River/Slate Creek Ranger District, Whitebird, Idaho.

[3]Also personal communication. 1996. Jerry Asher, Natural Resource Specialist, U.S. Department of Interior, Bureau of Land Management, Oregon State Office, Portland, Oregon.

Table 2.41 — Scientific names of weed species referenced in the evaluation of alternatives.

Weed Species	Scientific Name
Cheatgrass	*Bromus tectorum*
Whitetop	*Cardaria spp.*
Musk thistle	*Carduus nutans*
Purple starthistle	*Centaurea calcitrapa*
Diffuse knapweed	*Centaurea diffusa*
Iberian starthistle	*Centaurea iberica*
Spotted knapweed	*Centaurea maculosa*
Russian knapweed	*Centaurea repens*
Yellow starthistle	*Centaurea solstitialis*
Squarrose knapweed	*Centaurea virgata*
Rush skeletonweed	*Chondrilla juncea*
Canada thistle	*Cirsium arvense*
Common crupina	*Crupina vulgaris*
Leafy spurge	*Euphorbia esula*
Halogeton	*Halogeton glomeratus*
Spiny cocklebur	*Xanthium spinosum*
Orange hawkweed	*Hieracium aurantiacum*
Yellow hawkweed	*Hieracium pratense*
St. Johnswort	*Hypericum perforatum*
Dyers woad	*Isatis tinctoria*
Perennial pepperweed	*Lepidium latifolium*
Dalmatian toadflax	*Linaria dalmatica*
Purple loosestrife	*Lythrum salicaria*
Matgrass	*Nardus stricta*
Scotch thistle	*Onopordum acanthium*
African rue	*Peganum harmala*
Sulfur cinquefoil	*Potentilla recta*
Mediterranean sage	*Salvia aethiopis*
Tansy ragwort	*Senecio jacobaea*
Medusahead	*Taeniatherum caput-medusae*
Saltcedar	*Tamarix ramosissima*
Syrian bean-caper	*Zygophyllum fabago*

Sources of nomenclature: Hitchcock and Cronquist (1976) and Whitson and others (1991).

A potential vegetation group (PVG) is defined as potential vegetation types (PVTs) that are grouped on the basis of similar successional response to disturbance. A potential vegetation type is defined by the dominant vegetation that will potentially grow on a site in the absence of disturbance.

Exotic weed invasion was assumed to be a disturbance that potentially would prevent attainment of a potential vegetation type on a site. Exotic weed invasion can disrupt vegetation succession on a site by displacing native vegetation and either reducing or eliminating the seed bank of native species, thus preventing succession from proceeding to the potential vegetation type.

Rangeland Assumption 2: A rank is a numerical prediction of the effectiveness of an alternative to prevent further infestation of a potential vegetation group by noxious weeds and cheatgrass in the next 100 years. Ranks ranged from 0 to 3, with their effectiveness being as follows:

Ranks of 0 to 1: Low effectiveness

Ranks of greater-than-1 to 2: Moderate effectiveness

Ranks of greater-than-2 to 3: High effectiveness

A high rank represents a prediction for prevention of further infestation and some decline in the areal extent of noxious weeds and cheatgrass within a PVG. The decline in areal extent of noxious weeds and cheatgrass increases as the rank approaches 3. Ranks of 2 or less represent predictions of further infestation of the potential vegetation group. As the rank decreases toward 0, more of the potential vegetation group is at risk of invasion by weeds.

Rangeland Assumption 3: For noxious weed control efforts to be of some benefit to biodiversity and productivity of native rangeland plant communities, some of the acreage proposed for "Livestock Management" activity in table 3-7 in the preliminary draft EISs is assumed to be directed to the same land base as the acreage proposed for noxious weed control in the "Improve Rangelands" activity. Attention to proper livestock management post-weed control can aid in preventing or slowing reinvasion by noxious weeds and cheatgrass.

Rangeland Assumption 4: Some acreage included in the Prescribed Burning activity in table 3-7 in the preliminary draft EISs is assumed to apply to weed control, either directly or indirectly, depending on the weed species within the range clusters. For example, prescribed burning can be used to control medusahead and cheatgrass if the treatment is implemented at the vulnerable phenological stage of the weed. Prescribed burning for control of woody species can either benefit weed control or enhance weed spread, depending on timing of the burn.

Rangeland Assumption 5: For purposes of this document, the weed species assessed by Karl and others (1995) that are presented in appendix 2L, tables 2L.1 through 2L.6, and discussed in this evaluation, are considered the primary weeds to be targeted for weed control. However, other noxious weeds that are present and located in the project area would also be assumed to be a priority for IWM.

Further, although cheatgrass is not legally declared noxious in the Basin, the alternatives and the IWM strategy are assumed to address cheatgrass as an undesirable weed. Acreages proposed for control efforts in the "Improve Rangelands" activity in table 3-7 in the preliminary draft EISs are assumed to include cheatgrass.

Rangeland Assumption 6: The midpoint of the range of acres in the activities specific to "Improve Rangelands," "Livestock Management," and "Prescribed Burning" in table 3-7 of the preliminary draft EISs are assumed to be the maximum areas directed toward weed control.

There are some inconsistencies between the Effectiveness of Alternatives discussions in the following text and those listed in appendix 2N, tables 2N.1 through 2N.6. Acres referenced in this evaluation were compiled from the February 1996 version of DEIS, whereas acres in appendix 2N present modified acreage figures from later DEIS analysis. These modified acreage figures were not available when rankings were made. Inconsistencies are most noticeable for range clusters 2, 3, and 4, and are noted in the text.

Rangeland Assumption 7: All alternatives direct IWM efforts first to high disturbance areas, which typically include roads, waterways, campgrounds, and trails.

Rangeland Assumption 8: Any noxious weeds already present in proposed reserves in Alternative 7 are assumed to continue to spread, but at a slower rate than uncontrolled spread outside reserves. Reserves, especially in range cluster 4, are typically areas that are fragmented, of relatively small size, and often surrounded by private land, including some used for agricultural purposes. The agricultural land, in particular, can be a source of noxious weed invasion on rangeland. There is a greater likelihood for noxious weeds to continue invading and spreading into reserves on these fragmented areas, compared with less fragmented, more contiguous blocks of land within reserves.

Rangeland Assumption 9: Assumptions were made about the steps of IWM applicable to each range cluster, according to the cluster's specific objective or emphasis (table 2.42).

Discussions on Effectiveness of Alternatives in Integrated Weed Management

The following discussion focuses on the ranks used in evaluating the effectiveness of alternatives to prevent further weed infestation. The evaluation is specific to the dry grass, dry shrub, and cool shrub potential vegetation groups in the six range clusters within the Eastside and Upper Columbia River Basin EIS areas. Information is organized by the three potential vegetation groups (dry grass, dry shrub, and cool shrub), then within each of these PVGs by alternatives, EIS area, and range cluster. Each potential vegetation group discussion also includes a table presenting the ranks of effectiveness (tables 2.43-2.48).

Dry Grass Potential Vegetation Group, EEIS

Each alternative's effectiveness in preventing further infestations of the dry grass potential vegetation group in the Eastside EIS area is ranked by range cluster and alternative in table 2.43.

Alternatives 1, 2, and 5 Effectiveness (Dry Grass, EEIS)

Overall rank: 0.17, at the low end of Low effectiveness.

Effectiveness in preventing further infestation of dry grass:

Range cluster 4: Limited

Other range clusters: Poor

Acreages projected for weed control in Alternatives 1, 2, and 5 would be inadequate to prevent the spread of noxious weeds and their further infestation in the dry grass PVG.

Alternative 3 Effectiveness (Dry Grass, EEIS)

Overall rank: 1.21, near the lower end of Moderate effectiveness; slightly lower than Alternative 4.

Effectiveness in preventing further infestation of dry grass:

Range clusters 5 and 6: High; similar to Alternative 4.

Range clusters 1 through 4: Relatively poor.

Cluster 1 — *Prediction: Further infestation of dry grass.* The level of further infestation would be about the same as Alternative 4. Compared with Alternative 4, the weed control emphasis in Alternative 3 would not be as strong, because only yellow starthistle and dalmatian toadflax would receive focus for weed control efforts. However, since the acreages scheduled for weed control are the same in both alternatives, their level of weed control would be about the same. In this cluster, as in Alternative 4, existing infestations would not likely be reduced in size.

Cluster 2 — *Prediction: Further infestation of this cluster's dry grass, attributable to continued spread of diffuse knapweed.* This prediction was made because the acreage projected for weed control in this cluster would be almost negligible (inconsistency; see rangeland assumption 6). Dry grass currently totals approximately 72,000 acres (29,150 ha) on BLM- and FS-administered lands, 95 percent of which is the fescue grassland with conifer PVT, a PVT that is of high susceptibility to invasion by diffuse knapweed.

Cluster 3 — *Prediction: Further infestation of dry grass.* Weed species expected to be the focus of IWM efforts in this cluster include spotted knapweed, yellow starthistle, leafy spurge, and sulfur cinquefoil, all of which are highly invasive on dry grass. The acreage scheduled for weed control in this cluster is almost negligible (inconsistency; see rangeland assumption 6); this would lead to continued spread of noxious weeds and infestation of dry grass, especially the fescue grassland PVTs, at about the same rate as in Alternative 4.

Table 2.42 — Assumptions about the seven steps of integrated weed management relative to alternative objectives/emphasis. The IWM strategy was adapted from Sheley (1994) and used as the foundation for weed management in the preliminary draft EISs.

	Description and Use of Seven Steps of Integrated Weed Management						
Emphasis of Alternative	Step 1 Inventory and Map	Step 2 Prevent Weed Encroachment	Step 3 Detect and Eradicate New Introductions	Step 4 Contain Large-Scale Infestations	Step 5 Control Large-Scale Infestations	Step 6 Revegetate	Step 7 Proper Range Management
Restore	X	X	X	X	X	X[1]	X
Conserve	X	X	X	X	[2]	[2]	[2]
Produce	X	X	X	X	X	X[3]	X
Restore-Produce	X	X	X	X	X	X[4]	X[5]
Conserve-Restore	X	X	X	X	X[6]	X[6]	X[6]
Produce-Conserve[7]	X	X	X	X	X	X	X

[1]Revegetation with native species is assumed to be priority, in comparison with the produce emphasis, where revegetation with exotic perennial species (primarily grasses) may be of greater priority. The rationale for using native species is to permit enhancement of floral diversity and also biodiversity. Use of desirable exotic perennial species is an option where native species are not competitive or not available.

[2]These steps could be implemented, but are not priority for this objective. The rationale is that Steps 5 - 7 focus on reducing the size and extent of current infestations with the intent of reclaiming native plant communities, rather than preventing further infestation onto lands not currently infested as is the focus of Steps 1 - 4. The focus of Steps 1 - 4 is more appropriate for a "conserve" objective.

[3]Revegetation with exotic perennial species (primarily grasses) may be of greater priority, in comparison with the restore emphasis where revegetation with native species will be the priority. The rationale for using exotic, perennial species (primarily grasses) is to enhance forage production for livestock and provide aggressive competition with weeds. Use of native species is expected if objectives can be met.

[4]Revegetation with native species is assumed to be greater priority, in comparison with exotic, perennial species.

[5]Proper Range Management is assumed to occur within this emphasis as part of produce. Livestock management practices are assumed to be implemented at a moderate level. There is less assumed chance of loss of native or exotic revegetated species within this emphasis, compared with the produce emphasis, and consequently also less frequent need to revegetate repeatedly to prevent weed reinvasion.

[6]Steps 5 through 7 of Integrated Weed Management are assumed to be applied for the restore portion of this emphasis.

[7]In this emphasis, Steps 1 through 4 of Integrated Weed Management are implemented to conserve. For the produce portion, Steps 5 through 7 are assumed to occur to reclaim noxious weed-infested sites and permit vegetation production that will sustain livestock.

Table 2.43 — Rank of the effectiveness of alternatives in controlling noxious weeds and cheatgrass in the dry grass potential vegetation group (Eastside EIS).[1]

	Rank of Control Effectiveness by Alternative						
Range Cluster	1	2	3	4	5	6	7
1	0	0	0.75	0.75	0	0.75	0.5
2	0	0	0	0	0	0	2
3	0	0	0	0	0	0	0
4	1	1	1	1	1	1.5	1
5	0	0	2.5	3	0	0.75	1.5
6	0	0	3	3	0	3	2.5
Overall Rank	0.17	0.17	1.21	1.29	0.17	1	1.25

[1]0-1 = low effectiveness.
1-2 = moderate effectiveness.
2-3 = high effectiveness.

Ranks should not be compared between clusters, but rather more appropriately within a cluster across alternatives.

Cluster 4 — *Prediction: Slow invasion of dry grass in extent at about the same rate as in Alternative 4.* This prediction is due to both alternatives having no acreages scheduled for weed control. Weed species of IWM emphasis in this cluster would be: leafy spurge, yellow starthistle, and dalmatian toadflax, all of which are highly invasive on dry grass. The level of weed control for this cluster for the entire EEIS area, none under Alternative 3, is less than that currently being implemented on the BLM's Spokane District alone.

Cluster 5 — *Prediction: Some reclaiming of dry grass from weeds by year 100.* Weed species that would be a focus of IWM efforts are yellow starthistle, Mediterranean sage, and dalmatian toadflax. Of the species listed as problematic on dry grass in this cluster (appendix 2L, table 2L.5), yellow starthistle would be the probable target of most acreage scheduled for weed control. Although Alternative 3 would be effective in preventing further infestation of dry grass by yellow starthistle, Mediterranean sage, and dalmatian toadflax, some further infestation by other species such as medusahead would likely continue. The lesser level of livestock management under this alternative, compared with Alternative 4, would present increased risk for reinvasion of noxious weeds, such as yellow starthistle, after treatment.

Cluster 6 — *Prediction: Some reclaiming of dry grass from weeds by year 100.* Although the weed control emphasis under Alternative 3 is not as strong as in Alternative 4, the acreages scheduled for weed control treatment under Alternative 3 should be adequate to curtail the spread of problematic noxious weed species in dry grass and to reclaim some of the dry grass that has been infested.

Alternative 4 Effectiveness (Dry Grass, EEIS)

Overall rank: 1.29, near the low end of Moderate effectiveness.

Effectiveness in preventing further infestation of dry grass:

Range clusters 5 and 6: High

Range clusters 1 through 4: Relatively poor

Cluster 1 — *Prediction: Further infestation of dry grass.* Weed species in this cluster receiving IWM emphasis would be yellow starthistle, dalmatian toadflax, diffuse knapweed, rush skeletonweed, medusahead, and whitetop. The IWM emphasis of Alternative 4 would be to accommodate control (reduction in size) of infestations of these species and rehabilitation of dry grass. However, because of this cluster's infestation extent and

highly roaded nature, the acreages scheduled for weed control would only accommodate control of these species in high-disturbance areas such as along roads. Spread of existing infestations would continue.

Cluster 2 — *Prediction: Further infestation of dry grass.* Weed species in this cluster receiving IWM emphasis would include crupina, diffuse knapweed, and tansy ragwort. However, no acreage would be scheduled for weed control under this alternative. Of the three species mentioned, diffuse knapweed in particular would continue to spread and result in further infestation of the already limited dry grass in this cluster.

Cluster 3 — *Prediction: Further infestation of dry grass.* Weed species in this cluster receiving IWM emphasis would be: whitetop, diffuse knapweed, spotted knapweed, yellow starthistle, orange and yellow hawkweeds, leafy spurge, matgrass, sulfur cinquefoil, tansy ragwort, and rush skeletonweed. Since Alternative 4 does not schedule acreage in this cluster for weed control, these species would continue to spread and infest dry grass, particularly the fescue grassland PVTs.

Cluster 4 — *Prediction: Slow invasion of dry grass.* This prediction is due to no acreage being scheduled for weed control under this alternative. Weed species that would be emphasized by IWM in this cluster would be whitetop, diffuse knapweed, leafy spurge, yellow starthistle, rush skeletonweed, and dalmatian toadflax. The level of weed control projected for this cluster and alternative for the entire EEIS area, which is none, would be less than weed control that is currently implemented for this cluster on the BLM's Spokane District alone.

Clusters 5 and 6 — *Prediction: Some reclaiming of dry grass from weeds by year 100.* The acreage scheduled under the "Improve Rangelands" activity in these clusters is quite high, and should be adequate to curtail further spread of the weed species proposed as problematic in dry grass (appendix 2L, tables 2L.5 and 2L.6). Further infestation of wheatgrass grassland, fescue grassland, and fescue grassland with conifer PVTs will be prevented.

Alternative 6 Effectiveness (Dry Grass, EEIS)

Overall rank: 1, at high end of low effectiveness.

Effectiveness in preventing further infestation of dry grass:

Range cluster 6: High

Range cluster 4: Moderate

Range clusters 1, 2, 3 and 5: Relatively poor

Clusters 1, 2, and 3 — See discussion for these clusters under Alternative 4.

Cluster 4 — *Prediction: Further infestation of dry grass in this cluster, but to a lesser extent than in Alternative 4.* The IWM emphases of Alternatives 6 and 4 are identical, except there would be more acreage scheduled for weed control in Alternative 6 (inconsistency; see rangeland assumption 6). Even with the greater acreage for weed control, there would be some further infestation of dry grass.

Cluster 5 — *Prediction: Further infestation of dry grass.* The infestations would be attributable to the relatively low acreage scheduled for weed control, compared with Alternative 4. Sources of infestation would be diffuse knapweed, yellow starthistle, rush skeletonweed, medusahead, dalmatian toadflax, and whitetop. Although Alternative 6 would place more emphasis than Alternative 4 on eradicating new infestations and preventing spread of species, the acreage scheduled for weed control under Alternative 6 would not likely prevent further infestation of dry grass.

Cluster 6 — *Prediction: Some reclaiming of dry grass from weeds by year 100.* Weed species that would receive IWM emphasis include yellow starthistle, Mediterranean sage, diffuse knapweed, spotted knapweed, dalmatian toadflax, and cheatgrass. The acreage scheduled for weed control is believed to be relatively high compared with the acreage of current infestations on dry grass. The acreage scheduled will permit retreatment of infestations.

Alternative 7 Effectiveness (Dry Grass, EEIS)

Overall rank: 1.25, at the low end of Moderate effectiveness; essentially the same as Alternatives 3 and 4.

Effectiveness in preventing further infestation of dry grass:

Range cluster 6: High

Range clusters 2 and 5: Moderate

Range clusters 1, 3, and 4: Relatively Poor

Cluster 1 — *Prediction: Further infestation of dry grass, slightly more than in Alternative 3.* There are approximately 113,000 acres (45,749 ha) of dry grass on BLM- and FS-administered lands in this cluster, of which 16 percent or some 18,000 acres (7,288 ha) is in reserves. The reserves are mostly in the Lost and Goose Lake subbasins near Lakeview, Oregon.

Yellow starthistle, medusahead, and possibly leafy spurge are species that threaten this dry grass in reserves. Most dry grass on BLM- and FS-administered lands is outside reserves; also, the weed control scheduled in this cluster and with this alternative's emphasis is less than in Alternative 3.

Cluster 2 — *Prediction: Minor further infestation of dry grass.* There are approximately 200,000 acres (80,972 ha) of dry grass on BLM- and FS-administered lands in this cluster as a whole, of which 93 percent or approximately 186,000 acres (75,304 ha) is in reserves. Almost all of the dry grass on BLM- and FS-administered lands in this cluster for both EIS areas is in reserves.

Presently, there is only a minor problem with noxious weeds in dry grass in this cluster; allocating most of the dry grass acreage to reserves should help prevent spread of noxious weeds, even without any acreage being scheduled for weed control under this alternative and cluster.

Cluster 3 — *Prediction: Further infestation of dry grass of about the same magnitude as other alternatives.* There are approximately 377,600 acres (152,875 ha) of dry grass on BLM- and FS-administered lands in this cluster as a whole, of which 46 percent or approximately 175,200 acres (70,931 ha) is in reserves. Most reserves within the EEIS area are in the North Fork John Day and Powder subbasins. The following species are predicted to be in those reserves, if not there already: whitetop, yellow starthistle, and Mediterranean sage.

Almost 95 percent of the dry grass in the Eastside EIS area of this cluster is either the fescue grassland or fescue grassland with conifer PVT. Although current acreage infestations of diffuse knapweed, yellow starthistle, whitetop, leafy spurge, and sulfur cinquefoil are not yet extensive, these weeds are quite invasive in these grass types. The acreage scheduled for weed control under Alternative 7, which is zero, would not slow their spread.

Cluster 4 — *Prediction: Further infestation of dry grass at about the same level as in Alternative 3.* There are approximately 71,000 acres (28,745 ha) of dry grass in this cluster on BLM- and FS-administered lands, of which 21 percent or approximately 15,100 acres (6,113 ha) are in reserves. This acreage in reserves is predicted to remain susceptible to weed invasion, even in the relative absence of disturbance under Alternative 7. The acreage scheduled for weed control is predicted to result in about the same level of weed control and suppression as in Alternative 3 (inconsistency; see rangeland assumption 6). Weed species that will further infest dry grass are diffuse knapweed, whitetop, yellow starthistle, rush skeletonweed, and dalmatian toadflax.

Cluster 5 — *Prediction: Further infestation of dry grass, but less further infestation than Alternative 6.* The acreage scheduled for weed control is greater than in Alternative 6. There are approximately 472,000 acres (191,093 ha) of dry grass in reserves in cluster 5 as a whole, less than half of which appears to be in the Eastside EIS area (map 2.25). Most dry grass in the EEIS area is located in the Imnaha subbasin, which has approximately 21,000 acres (8,502 ha) of the wheatgrass grassland PVT, and 86,000 acres (34,818 ha) of the

fescue grassland with conifer PVT. There are only about 192,000 acres (77,733 ha) of dry grass on BLM-and FS-administered lands in the EEIS area of this cluster, which includes 106,000 acres (42,915 ha) in the Imnaha subbasin, mostly in reserves. BLM- and FS-administered lands outside reserves have very little dry grass.

The effectiveness rank of Alternative 7 for this range cluster should be high, at least outside the reserves, due to the very low level of dry grass there and the sufficient acreage scheduled for weed control outside reserves. In the reserves, however, there could be a problem with yellow starthistle. This weed is a problem species in the dry grass PVG and has known likelihood for spreading in the wheatgrass grassland PVT, even without much disturbance.

Cluster 6 — *Prediction: Some reclaiming of dry grass from weeds by year 100.* There are approximately 165,100 acres (66,842 ha) of dry grass in reserves in cluster 6 for both EIS areas, very little of which appears to be in the Eastside EIS area. This means that the acreage scheduled for weed control must be directed essentially to the same land mass as in Alternative 3. However, Alternative 7 would have substantially less acreage scheduled for weed control than Alternatives 3, 4, and 6, and therefore less reclaiming of dry grass from weeds compared with those three alternatives.

Dry Grass Potential Vegetation Group (UCRB)

The effectiveness of the alternatives to prevent further infestations of the dry grass potential vegetation group in the Upper Columbia River Basin EIS area is ranked by range cluster and alternative on table 2.44.

Alternatives 1 and 2 Effectiveness (Dry Grass, UCRB)

Overall rank: 0, which is low effectiveness.

Effectiveness in preventing further infestation of dry grass:

Range clusters 2, 3, 5, and 6: Poor

The fragmented manner in which noxious weeds are controlled in these alternatives at present does not permit prevention of further infestation of dry grass by noxious weeds. A point needing resolution is that the substantive acreages scheduled per decade for weed control in clusters 5 [30,000 acres (12,146 ha)] and 6 [17,500 acres (7,085 ha)] in Alternative 2 may be greater than that actually being implemented on the ground.

Alternative 3 Effectiveness (Dry Grass, UCRB)

Overall rank: 1.5, the same as Alternative 4, which would be Moderate effectiveness.

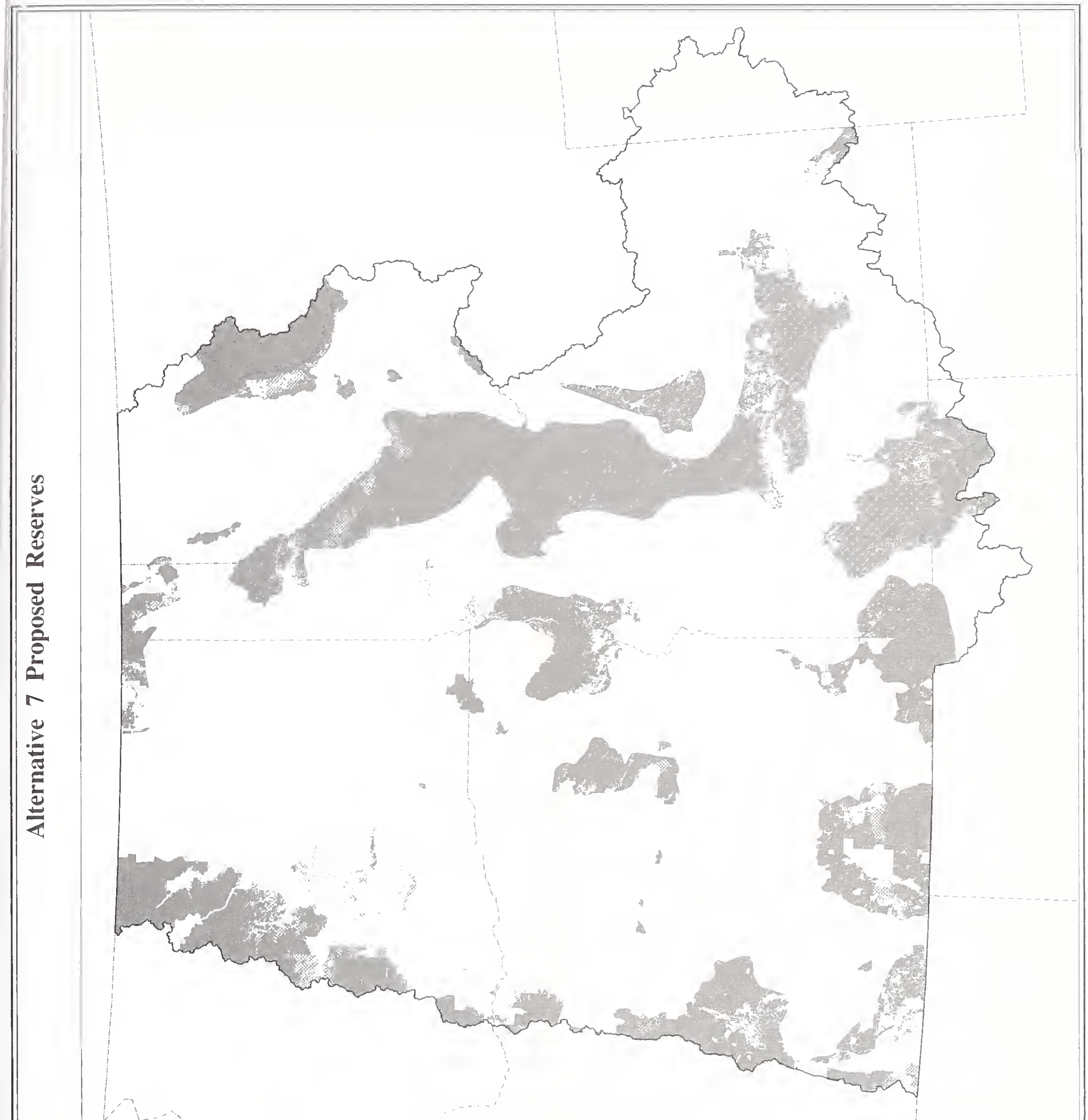
Effectiveness in preventing further infestation of dry grass:

Range clusters 5 and 6: High

Range clusters 2 and 3: Poor

Cluster 2 — *Prediction: Further infestation of dry grass by year 100.* Although noxious weeds are not a major problem on dry grass in this cluster, there would be some infestations attributable to leafy spurge, spotted knapweed, and yellow starthistle. The IWM emphasis is not as strong in Alternative 3 compared with Alternative 4, and the acreages scheduled for weed control and livestock management are nearly negligible (inconsistency; see rangeland assumption 6). Due to these two factors, weed control efforts under Alternative 3 in this cluster would not stop the spread of noxious weeds to non-infested areas, nor reclaim dry grass that is currently infested.

Cluster 3 — *Prediction: Further infestation of dry grass.* This would be attributable particularly to spotted knapweed, yellow starthistle, leafy spurge, and sulfur cinquefoil. The IWM emphasis is not as strong in Alternative 3 as in Alternative 4, and the acreages scheduled for weed control and livestock management are nearly negligible (inconsistency; see rangeland assumption 6). Weed control efforts would not stop the spread of noxious weeds to uninfested areas, nor would they reclaim dry grass that is currently infested.



Map 2.25 – Location of Alternative 7 proposed reserve areas on BLM- and FS-administered lands. Selection of proposed reserve areas was based on roadless areas greater than 400 ha (1,000 acres) that were distributed across a range of environments.

Table 2.44 — Rank of the effectiveness of alternatives in controlling noxious weeds and cheatgrass in the dry grass potential vegetation group by range cluster and alternative (Upper Columbia River Basin).[1]

	Rank of Control Effectiveness by Alternative						
Range Cluster	1	2	3	4	5	6	7
2	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0
5	0	0	3	3	0	1.5	2.5
6	0	0	3	3	1	3	2.5
Overall rank	0	0	1.5	1.5	0.25	1.12	1.25

[1]0-1 = low effectiveness.
1-2 = moderate effectiveness.
2-3 = high effectiveness.

Ranks should not be compared between clusters, but rather more appropriately within a cluster across alternatives.

Acreages proposed for weed control in this cluster for all alternatives in dry grass are below that currently being implemented on National Forests in the UCRB area,[4] which points to a flaw in the activity tables that needs to be resolved.

Cluster 5 — *Prediction: Prevention of further infestation of dry grass and, by year 100, some reclaiming of dry grass that is currently infested with noxious weeds.* Problem species of major concern in this cluster on dry grass are yellow starthistle, rush skeletonweed, medusahead, leafy spurge, cheatgrass, and possibly spotted knapweed. Although Alternative 3 has a weaker IWM emphasis than Alternative 4, its acreages scheduled for weed control should be adequate to prevent further spread of noxious weeds, particularly yellow starthistle and rush skeletonweed. These acreages also should accommodate reseeding efforts in dry grass areas that are currently infested with medusahead and cheatgrass to the point that native species have been displaced.

Acreages scheduled for livestock management, although less than Alternative 4, should be adequate to help prevent the spread of noxious weeds and prevent reinvasion of sites by noxious weeds after initial weed control.

Cluster 6 — *Prediction: Prevention of further infestation of dry grass and some reclaiming of dry grass by year 100 that is currently infested with noxious weeds.* Problem species of major concern in this cluster on dry grass are Dyers woad and leafy spurge. Although the IWM emphasis of Alternative 3 is weaker compared with Alternative 4, acreages scheduled for weed control should be adequate to prevent further spread of noxious weeds. These acreages also should be suitable to reseed in the dry grass areas that are currently so infested with medusahead and cheatgrass that native species have been displaced. The extent of dry grass having medusahead and cheatgrass infestations in this cluster is thought to be minor because there is very little dry grass in the western portion of the UCRB, where medusahead and cheatgrass are most prevalent. Further, acreages scheduled for livestock management should be adequate to help prevent the spread of noxious weeds and prevent the reinvasion of sites by noxious weeds after initial weed control.

Alternative 4 Effectiveness (Dry Grass, UCRB)

Overall rank: 1.5, which is Moderate effectiveness.

[4]Personal communication. 1996. Peter M. Rice, Research Associate, Division of Biological Sciences, University of Montana, Missoula, Montana.

Effectiveness in preventing further infestation of dry grass:

Range clusters 5 and 6: High

Range clusters 2 and 3: Poor

Cluster 2 — *Prediction: Further infestation of dry grass by year 100.* Although prevalence of noxious weeds on dry grass in this cluster is relatively minor, there would be continued infestation by leafy spurge, spotted knapweed, and yellow starthistle. Although this alternative would have a strong IWM emphasis, its acreages scheduled for weed control and livestock management are nearly negligible (inconsistency; see rangeland assumption 6). Weed control efforts undertaken in Alternative 4 would not stop the spread of noxious weeds to non-infested areas, nor reclaim dry grass that is currently infested in this cluster.

Cluster 3 — *Prediction: Further infestation of dry grass.* These infestations would particularly be attributable to spotted knapweed, yellow starthistle, leafy spurge, and sulfur cinquefoil. Although Alternative 4 would have a strong IWM emphasis, its acreages scheduled for weed control and livestock management are nearly negligible (inconsistency; see rangeland assumption 6). Its weed control efforts would not be adequate to stop the spread of noxious weeds to non-infested areas, or to reclaim dry grass that is currently infested.

Cluster 5 — *Prediction: Prevention of further infestation of dry grass and, by year 100, some reclaiming of dry grass that is currently infested with noxious weeds.* Problem species of major concern in this cluster on dry grass are yellow starthistle, rush skeletonweed, medusahead, leafy spurge, cheatgrass, and possibly spotted knapweed. This alternative would have a strong IWM emphasis and acreage scheduled for weed control should be adequate to prevent further spread of noxious weeds, particularly yellow starthistle and rush skeletonweed. In addition, the acreage would be adequate to do reseeding in dry grass areas currently so infested with medusahead and cheatgrass that native species have been displaced. Acreages scheduled for livestock management under Alternative 4 should be adequate to help prevent the spread of noxious weeds and prevent the reinvasion of sites by noxious weeds after initial weed control.

Cluster 6 — *Prediction: Prevention of further infestation of dry grass and, by year 100, some reclaiming of dry grass that is currently infested with noxious weeds.* Problem species of major concern in this cluster on dry grass are Dyers woad and leafy spurge. The IWM emphasis of Alternative 4 is strong, and further, the acreages scheduled for weed control should be adequate to prevent further spread of noxious weeds. These acreages of weed control also should accommodate reseeding efforts in dry grass areas currently so infested with medusahead and cheatgrass that native species have been displaced. The extent of dry grass having medusahead and cheatgrass infestations in this cluster is thought to be minor because there is very little dry grass in the western portion of the UCRB EIS area, where medusahead and cheatgrass are most prevalent. Acreages scheduled for livestock management in Alternative 4 should be adequate to help prevent the spread of noxious weeds and prevent the reinvasion of sites by noxious weeds after initial weed control.

Alternative 5 Effectiveness (Dry Grass, UCRB)

Overall rank: 0.25, which is Low effectiveness.

Effectiveness in preventing further infestation of dry grass:

Range clusters 2, 3, 5, and 6: Poor

Cluster 2 — *Prediction: Further infestation of dry grass by year 100.* Although prevalence of noxious weeds on dry grass in this cluster is relatively minor, there would be continued infestation by leafy spurge, spotted knapweed, and yellow starthistle. The IWM emphasis of Alternative 5 would be the same as Alternative 3, but the acreages scheduled for weed control and livestock management would be even less than Alternative 3 (inconsistency; see rangeland assumption 6). Weed control efforts would not stop the spread of noxious weeds to non-infested areas, nor reclaim dry grass that is currently infested.

Cluster 3 — *Prediction: Further infestation of dry grass.* Further infestation would be particularly attributable to spotted knapweed, yellow starthistle, leafy spurge, and sulfur cinquefoil. Alternatives 5 and 3 would have the same level of IWM emphasis, except the acreages scheduled for weed control and livestock management would be less for Alternative 5 (inconsistency; see rangeland assumption 6). This level of emphasis would not stop the spread of noxious weeds to non-infested areas, nor reclaim dry grass that is currently infested.

Cluster 5 — *Prediction: Further infestation of dry grass.* Noxious weed species in this cluster that are prevalent on dry grass include yellow starthistle, rush skeletonweed, medusahead, leafy spurge, cheatgrass, and possibly spotted knapweed. Although this alternative's IWM emphasis is stronger than Alternative 3 for this cluster, the acreages projected for weed control would be inadequate to prevent spread of noxious weeds. Compared with Alternative 3, the acreages scheduled for livestock management under Alternative 5 would be much lower, which would offer only limited effectiveness in preventing the spread of noxious weeds and preventing reinvasion of sites by noxious weeds after initial weed control.

Cluster 6 — *Prediction: Further infestation of dry grass not currently infested with noxious weeds.* Noxious weed species in this cluster that are prevalent on dry grass are Dyers woad and leafy spurge. Although this alternative's IWM emphasis is the same as Alternative 3, the acreages scheduled for weed control and livestock management under Alternative 5 would permit further infestation of dry grass. The acreage also would not be sufficient to permit reseeding of areas having dry grass dominated by cheatgrass and medusahead.

Alternative 6 Effectiveness (Dry Grass, UCRB)

Overall rank: 1.12, which is at the low end of Moderate effectiveness.

Effectiveness in preventing further infestation of dry grass:

Range cluster 6: High

Range cluster 5: Moderate

Range clusters 2 and 3: Poor

Cluster 2 — *Prediction: Further infestation of dry grass is predicted by year 100.* Although the prevalence of noxious weeds on dry grass in this cluster is relatively minor, there would be continued infestations attributable to leafy spurge, spotted knapweed, and yellow starthistle. Although Alternative 6 places a strong emphasis on weed management at essentially the same level as Alternative 4, its acreages scheduled for weed control and livestock management are nearly negligible (inconsistency; see rangeland assumption 6). The weed control efforts of Alternative 6 would not stop the spread of noxious weeds to non-infested areas, nor reclaim dry grass that is currently infested in this cluster.

Cluster 3 — *Prediction: Further infestation of dry grass.* Further infestation would be attributable particularly to spotted knapweed, yellow starthistle, leafy spurge, and sulfur cinquefoil. Although this alternative would have stronger IWM emphasis in this cluster than Alternative 4, its acreages scheduled for weed control and livestock management are nearly negligible. Weed control efforts would not stop the spread of noxious weeds to non-infested areas nor reclaim dry grass that is currently infested.

Cluster 5 — *Prediction: Further infestation of dry grass.* Further infestation would be attributable particularly to yellow starthistle, rush skeletonweed, medusahead, leafy spurge, cheatgrass, and possibly spotted knapweed. Although the Alternative 6 IWM emphasis in this cluster actually would be stronger than in Alternative 4, its acreage scheduled for weed control would be one-third that of Alternative 4. This acreage would still permit some further spread of noxious weeds into previously non-infested dry grass. The acreages scheduled for livestock management, which would be the same as in Alternative 4, should help prevent the spread of noxious weeds and prevent the reinvasion of sites by noxious weeds after initial weed control.

Cluster 6 — *Prediction: Prevention of further infestation of dry grass and, by year 100, some reclaiming of dry grass that is currently infested with noxious weeds.* Noxious weed species that are particularly prevalent in this cluster on dry grass are Dyers woad and leafy spurge. The IWM emphasis of Alternative 6 in this cluster would be just as strong as that of Alternative 4. Although acreages scheduled for weed control in Alternative 6 would be lower, they would still be adequate to prevent further spread of noxious weeds. This acreage should also accommodate reseeding efforts in dry grass areas currently so infested with medusahead and cheatgrass that native species have been displaced. The extent of dry grass having medusahead and cheatgrass infestations in this cluster is thought to be minor because there is very little dry grass in this cluster in the western portion of the UCRB EIS area, where medusahead and cheatgrass are most prevalent.

The acreages scheduled for livestock management under Alternative 6 should be adequate to help prevent the spread of noxious weeds and prevent reinvasion of sites by noxious weeds after initial weed control.

Alternative 7 Effectiveness (Dry Grass, UCRB)

Overall rank: 1.25, at the low end of Moderate effectiveness.

Effectiveness in preventing further infestation of dry grass:

Range clusters 5 and 6: High

Range clusters 2 and 3: Poor

Cluster 2 — *Prediction: Further infestation of dry grass by year 100.* Although prevalence of noxious weeds on dry grass in this cluster is relatively minor, there would be continued infestation by leafy spurge, spotted knapweed, and yellow starthistle. The IWM emphasis of this alternative would be less than Alternative 4, and acreages scheduled for weed control and livestock management are nearly negligible (inconsistency; see rangeland assumption 6). Weed control efforts in this cluster under Alternative 7 would not stop the spread of noxious weeds to non-infested areas nor reclaim dry grass that is currently infested.

Cluster 3 — *Prediction: Further infestation of dry grass.* Further infestation would be attributable particularly to spotted knapweed, yellow starthistle, leafy spurge, and sulfur cinquefoil. The IWM emphasis of Alternative 7 in this cluster is not as strong as Alternative 4, and the acreages scheduled for weed control and livestock management are nearly negligible (inconsistency; see rangeland assumption 6). Weed control efforts would not stop the spread of noxious weeds to non-infested areas nor reclaim dry grass currently infested.

Cluster 5 — *Prediction: Some reclaiming of dry grass from weeds by year 100.* The IWM emphasis of Alternative 7 would be the same as Alternative 3, but its acreages scheduled for weed control would be lower. With this emphasis and acreage level, further infestation of dry grass would be prevented outside reserves, but minor further infestation of dry grass would occur within reserves. Further, although acreages scheduled for livestock management would be lower than for Alternative 3, they should be adequate to help prevent the spread of noxious weeds and prevent the reinvasion of sites by noxious weeds after initial weed control.

Cluster 6 — *Prediction: Some reclaiming of dry grass from weeds by year 100.* Because areas outside of reserves have the same IWM emphasis as Alternative 3, comparing these two alternatives is useful. The acreages scheduled for weed control will not accommodate reseeding efforts in dry grass and for this reason there will be less net gain in dry grass compared with Alternative 3. Acreages scheduled for livestock management should be adequate to help prevent the spread of noxious weeds and prevent the reinvasion of sites by noxious weeds after initial weed control.

There is concern, however, that the lack of control efforts in reserves would permit the establishment and spread of leafy spurge and Dyers woad, and perhaps other noxious weeds such as spotted knapweed, in the dry grass PVG (comprised

mostly of the fescue grassland with conifer PVT in the Big Wood subbasin).

Dry Shrub Potential Vegetation Group (EEIS)

The effectiveness of the alternatives to prevent further infestations of the dry shrub potential vegetation group in the Eastside EIS area is ranked by range cluster and alternative in table 2.45.

Alternatives 1 and 2 Effectiveness (Dry Shrub, EEIS)

Overall rank: 0.25, which is Low.

Effectiveness in preventing further infestation of dry shrub:

Range cluster 4: Moderate

Range clusters 1-3, 5, and 6: Poor

A continuation of the present fragmented manner of noxious weed control in these alternatives would not permit prevention of further infestation of dry shrub by noxious weeds. A point needing resolution is that the substantive areas scheduled per decade for weed control in clusters 5 [45,000 acres (18,219 ha)] and 6 [112,500 acres (45,547 ha)] in Alternative 2 may exceed that actually being implemented by the BLM and FS currently.

Cluster 4 — *Prediction: Some further infestation of dry shrub, but at a slower rate than other clusters.* The amounts scheduled for weed control in this cluster under Alternatives 1 and 2 would be similar to current implementation levels on the BLM's Spokane District in Washington, where weed spread is not rampant at this time. In this cluster, there would be concern with the prevalence of cheatgrass in the understory of dry shrub and its strong propensity to dominate after wildfires.

Alternative 3 Effectiveness (Dry Shrub, EEIS)

Overall rank: 1.83, at the upper end of Moderate.

Effectiveness in preventing further infestation of dry shrub:

Range clusters 5 and 6: High

Range clusters 1, 2, and 4: Moderate

Range cluster 3: Poor

Cluster 1 — *Prediction: Minor further infestation of dry shrub.* Noxious weeds with prevalence on dry shrub in this cluster are diffuse knapweed, medusahead, and dalmatian toadflax. Weeds of lesser extent are yellow starthistle, whitetop, halogeton, and rush skeletonweed. The IWM emphasis of this alternative would not be as strong in this cluster as in Alternatives 4 and 6.

Table 2.45 — Rank of the effectiveness of alternatives in controlling noxious weeds and cheatgrass in the dry shrub potential vegetation group by range cluster and alternative (Eastside EIS).[1]

	Rank of Control Effectiveness by Alternative						
Range Cluster	1	2	3	4	5	6	7
1	0	0	2	2.25	0.75	2.25	0.5
2	0	0	2	2.75	2	2	1.5
3	0	0	0	0.5	0.5	0.5	0
4	1.5	1.5	2	2	2	2	1
5	0	0	2.5	2.75	1.5	2	1.5
6	0	0	2.5	3	2.5	2.75	1
Overall rank	0.25	0.25	1.83	2.21	1.54	1.92	0.92

[1]0-1 = low effectiveness.
1-2 = moderate effectiveness.
2-3 = high effectiveness.

Ranks should not be compared between clusters, but rather more appropriately within a cluster across alternatives.

The acreage scheduled for weed control would be targeted specifically to diffuse knapweed and halogeton, because dry shrub is of high susceptibility to invasion by these species. The amount of acreage should be adequate to control (reduce infestation size) diffuse knapweed and halogeton, and permit some control of the other species. Alternative 3 would not, however, emphasize containment and prevention of spread of noxious weeds in this cluster.

Cluster 2 — *Prediction: Minor further infestation of dry shrub.* Of the dry shrub in this cluster on BLM- and FS-administered lands, 92 percent is the antelope bitterbrush PVT. The antelope bitterbrush PVT is of high susceptibility to invasion by diffuse knapweed, the major noxious weed in this cluster that threatens dry shrub. The IWM emphasis of this alternative in this cluster would be less than Alternative 4. The limited acreage scheduled for weed control (inconsistency; see rangeland assumption 6) would specifically target diffuse knapweed but would likely be inadequate to totally prevent spread of this species and further infestation.

Cluster 3 — *Prediction: Further infestation of dry shrub.* Noxious weeds with prevalence in dry shrub in this cluster are whitetop and possibly yellow starthistle. Others, such as diffuse knapweed, squarrose knapweed, and rush skeletonweed, are less extensive at present; in the future, however, they could become prevalent weeds in dry shrub in this cluster. The IWM emphasis of this alternative would be less than Alternatives 4 and 6, attributable in part to less acreage being scheduled for weed control. The level of weed control would not be adequate to prevent further spread of noxious weeds into dry shrub, especially whitetop. Although diffuse knapweed is quite extensive in this cluster, its distribution overlaps very little with the distribution of dry shrub within the cluster.

Cluster 4 — *Prediction: Minor further infestation of dry shrub, at about the same level as in Alternative 4.* Noxious weeds within dry shrub in this cluster are diffuse knapweed, Russian knapweed, dalmatian toadflax, cheatgrass, and potentially yellow starthistle. The IWM emphasis of Alternative 3 would not be as strong in this cluster as in Alternatives 4 and 6. Of the weeds listed, cheatgrass would be the major target of IWM efforts because dry shrub is of high susceptibility to invasion by cheatgrass. The acreage scheduled for weed control would be applied to the other weeds listed with somewhat lesser priority.

The acreage scheduled for weed control in Alternative 3 would be the same as in Alternatives 4 and 6, and even with this level of weed management, further infestation of dry shrub is predicted, particularly by diffuse knapweed.

Cluster 5 — *Prediction: Prevention of further infestation of dry shrub and some reclaiming of dry shrub from weeds by year 100.* Noxious weeds with prevalence in dry shrub in this cluster include diffuse knapweed, medusahead, halogeton, cheatgrass, and possibly rush skeletonweed. Of these, halogeton and cheatgrass likely infest the most land in dry shrub, with halogeton now being especially prevalent in the Alvord Lake subbasin. The IWM emphasis of this alternative would not be as strong in this cluster compared with Alternatives 4 and 6. Further, of the five species mentioned as problematic in this cluster, only halogeton and cheatgrass would actually be the target of weed control efforts. However, the acreage scheduled is great enough to permit weed control efforts to be directed to the other species as well. There would be concern about the extensive acreages on Other (non-BLM/FS) lands that are currently infested with diffuse knapweed in the central Washington portion of this cluster. We assume control of diffuse knapweed would be undertaken on these lands, and weed control efforts would be coordinated so that diffuse knapweed invasion and spread on BLM- and FS-administered lands can be prevented or slowed.

Cluster 6 — *Prediction: Prevention of further infestation of dry shrub and some reclaiming of dry shrub from weeds by year 100.* Noxious weeds with prevalence in dry shrub in this cluster include halogeton, medusahead, Mediterranean sage,

cheatgrass, and possibly dalmatian toadflax and rush skeletonweed. Cheatgrass, medusahead, and Mediterranean sage are assumed to contribute the majority of weed acreage in dry shrub.

The IWM control emphasis of Alternative 3 would not be as strong as that in Alternatives 4 or 6. Of the six problematic species, cheatgrass, Mediterranean sage, and halogeton would be a priority for weed control. Although acreages scheduled for weed control in this cluster would be suitable to effectively prevent spread of the priority species and to control their infestation size as well, species such as medusahead could continue to spread. No acreage would be scheduled for prescribed fire activity in Alternative 3, which would aid in preventing further spread of these weed species.

Alternative 4 Effectiveness (Dry Shrub, EEIS)

Overall rank: 2.21, at the low end of High effectiveness.

Effectiveness in preventing further infestation of dry shrub:

Range clusters 1, 2, 5 and 6: High

Range cluster 4: Moderate

Range cluster 3: Poor

Cluster 1 — *Prediction: Prevention of further infestation of dry shrub and some reclaiming of dry shrub from weeds by year 100.* Noxious weeds with prevalence on dry shrub in this cluster are diffuse knapweed, medusahead, and dalmatian toadflax. Weeds of lesser extent are yellow starthistle, whitetop, halogeton, and rush skeletonweed. The IWM emphasis under this alternative would be strong in this cluster, with the acreage scheduled for weed control being directed mostly to control (reduction in infestation size) and rehabilitation of infested areas after initial weed control.

Cluster 2 — *Prediction: Prevention of further infestation of dry shrub and some reclaiming of dry shrub from weeds by year 100.* Of the dry shrub in this cluster on BLM- and FS-administered lands, 92 percent is the antelope bitterbrush PVT. The antelope bitterbrush PVT is of high susceptibility to invasion by diffuse knapweed, the major noxious weed in this cluster that threatens dry shrub. Considering the strong IWM emphasis of Alternative 4 and the acreage scheduled for weed control, some control of diffuse knapweed in this cluster would be predicted.

Cluster 3 — *Prediction: Further infestation of dry shrub.* Noxious weeds with prevalence in dry shrub in this cluster are whitetop and possibly yellow starthistle. Others, such as diffuse knapweed, squarrose knapweed, and rush skeletonweed, are less extensive at present but could be prevalent weeds in dry shrub in this cluster in the future. Although the emphasis of this alternative would be strong in regard to IWM, the acreage scheduled for weed control would not be adequate to prevent further spread of noxious weeds onto dry shrub, particularly whitetop. Although diffuse knapweed is quite extensive in this cluster, its distribution overlaps very little with the distribution of dry shrub within the cluster.

Cluster 4 — *Prediction: Minor further infestation of dry shrub.* Noxious weeds with prevalence in dry shrub in this cluster are diffuse knapweed, Russian knapweed, dalmatian toadflax, cheatgrass, and potentially yellow starthistle. The IWM emphasis of this alternative would be strong in this cluster, with all five problem weeds being the target of weed control efforts. However, the acreage scheduled for weed control would not prevent further infestation of dry shrub, particularly by diffuse knapweed.

Cluster 5 — *Prediction: Prevention of further infestation of dry shrub, some reclaiming of dry shrub from weed by year 100.* Noxious weeds with prevalence in dry shrub in this cluster include diffuse knapweed, medusahead, halogeton, cheatgrass, and possibly rush skeletonweed. Of these five, halogeton and cheatgrass likely infest the most extensive land area in dry shrub, with halogeton particularly being a problem in the Alvord Lake subbasin. The IWM emphasis of

Alternative 4 would be strong in this cluster, with all species mentioned above being prioritized for weed control efforts. Of concern would be the extensive acreages of dry shrub on Other lands that are currently infested with diffuse knapweed in the central Washington portion of this cluster. We assume control of diffuse knapweed would be undertaken on Other lands and efforts would be coordinated to prevent or slow the invasion and spread of diffuse knapweed onto BLM- and FS-administered lands.

Cluster 6 — *Prediction: Prevention of further infestation of dry shrub and some reclaiming of dry shrub from weeds by year 100.* Noxious weeds with prevalence in dry shrub in this cluster include halogeton, medusahead, Mediterranean sage, cheatgrass, and possibly dalmatian toadflax and rush skeletonweed. The majority of weed acreage in dry shrub is contributed by three of these six species: cheatgrass, medusahead, and Mediterranean sage. Alternative 4 has a strong IWM emphasis in this cluster. The acreages scheduled for weed control will prevent further infestation of dry shrub and also permit reseeding efforts, with emphasis on native species, on lands dominated by these noxious weeds. There would be no prescribed fire, which would aid in preventing further spread of these weed species, scheduled.

Alternative 5 Effectiveness (Dry Shrub, EEIS)

Overall rank: 1.54, which is Moderate.

Effectiveness in preventing further infestation of dry shrub:

Range cluster 6: High

Range clusters 2, 4, and 5: Moderate

Range clusters 1 and 3: Poor

Cluster 1 — *Prediction: Further infestation of dry shrub.* Noxious weeds with prevalence on dry shrub in this cluster are diffuse knapweed, medusahead, and dalmatian toadflax; weeds of lesser extent are yellow starthistle, whitetop, halogeton, and rush skeletonweed. The IWM emphasis in Alternatives 5 and 3 would be the same, but Alternative 5 would schedule much less acreage. The acreage would specifically target diffuse knapweed and halogeton.

Cluster 2 — See discussion for this cluster under Alternative 3.

Cluster 3 — *Prediction: Further infestation of dry shrub, at the same level as in Alternative 4.* Noxious weeds with prevalence in dry shrub in this cluster are whitetop and, possibly, yellow starthistle. Others, such as diffuse knapweed, squarrose knapweed, and rush skeletonweed, are less extensive at present but could become prevalent on dry shrub in this cluster in the future. Although diffuse knapweed is quite extensive in this cluster, its distribution overlaps very little with dry shrub within the cluster.

Although the acreage scheduled for control would be the same as Alternative 4, the IWM emphasis of Alternative 5 would not be as strong. This level of control would not be adequate to prevent further spread of noxious weeds into dry shrub, particularly by whitetop.

Cluster 4 — See discussion for this cluster under Alternative 3.

Cluster 5 — *Prediction: Further infestation of dry shrub.* Noxious weeds with prevalence on dry shrub in this cluster include diffuse knapweed, medusahead, halogeton (particularly in the Alvord Lake subbasin), cheatgrass, and possibly rush skeletonweed. Of these, halogeton and cheatgrass are proposed to cover the most extensive land in dry shrub. Although the IWM emphasis of Alternative 5 in this cluster would be stronger than under Alternative 3, the acreage scheduled would be much less and would actually target only halogeton. The acreage scheduled, however, is great enough that some weed control efforts would be directed to the other species as well, but not to the extent of Alternative 3.

There would be concern with the extensive acreages of dry shrub on Other lands that are currently infested with diffuse knapweed in the cen-

tral Washington portion of this cluster. We assume control of diffuse knapweed would be done on Other lands and coordinated to prevent diffuse knapweed from invading and spreading onto BLM- and FS-administered lands.

Cluster 6 — *Prediction: Nearly the same as for this cluster in Alternative 3, except for the slight difference that very minor acreage would be scheduled under Alternative 5 for prescribed burning.*

Alternative 6 Effectiveness (Dry Shrub, EEIS)

Overall rank: 1.92, at the high end of Moderate effectiveness.

Effectiveness in preventing further infestation of dry shrub:

Range clusters 1 and 6: High

Range clusters 2, 4, and 5: Moderate

Range cluster 3: Poor

Cluster 1 — See discussion for this cluster under Alternative 4.

Cluster 2 — *Prediction: Minor further infestation of dry shrub.* Of dry shrub in this cluster on BLM- and FS-administered lands, 92 percent is the antelope bitterbrush PVT. The antelope bitterbrush PVT is of high susceptibility to invasion by diffuse knapweed, the major noxious weed in this cluster that threatens dry shrub. Alternative 6 in this cluster would have the same IWM emphasis as Alternative 4, but only half the acreage (inconsistency; see rangeland assumption 6).

Cluster 3 — *Prediction: Further infestation of dry shrub, at the same level as Alternative 4.* Noxious weeds with prevalence in dry shrub in this cluster are whitetop and, possibly, yellow starthistle. Others, such as diffuse knapweed, squarrose knapweed, and rush skeletonweed, are less extensive at present but could be prevalent in dry shrub in the future. Diffuse knapweed is quite extensive in this cluster, but its distribution overlaps very little with the distribution of dry shrub within the cluster.

Although Alternative 6 would have a stronger IWM emphasis than Alternative 4 and the same acreage scheduled, Alternative 6 would not be adequate to prevent further spread of noxious weeds into dry shrub, particularly by whitetop.

Cluster 4 — See discussion for this cluster under Alternative 4.

Cluster 5 — *Prediction: Minor further infestation of dry shrub.* Noxious weeds with prevalence in dry shrub in this cluster include diffuse knapweed, medusahead, halogeton (particularly in the Alvord Lake subbasin), cheatgrass, and possibly rush skeletonweed. Of these, halogeton and cheatgrass are proposed to cover the most extensive land in dry shrub.

The IWM emphasis of this alternative would actually be stronger in this cluster compared with Alternative 4, and all weeds mentioned above would be prioritized for weed control efforts. Under Alternative 6, however, only one-third of the acreage as Alternative 4 would be scheduled for weed control. There would also be concern with the extensive acreages of dry shrub on Other lands that are currently infested with diffuse knapweed in the central Washington portion of this cluster. We assume control of diffuse knapweed would be undertaken on Other lands and efforts be coordinated to prevent invasion and spread of diffuse knapweed onto BLM- and FS-administered lands.

Cluster 6 — *Prediction: Prevention of further infestation of dry shrub and some reclaiming of dry shrub from weeds by year 100.* Noxious weeds with prevalence in dry shrub in this cluster include halogeton, medusahead, Mediterranean sage, cheatgrass, and possibly dalmatian toadflax and rush skeletonweed. The majority of weed acreage in dry shrub is contributed by three of these species: cheatgrass, medusahead, and Mediterranean sage.

The IWM emphasis of Alternative 6 in this cluster would be strong, the same as Alternative 4. The acreages scheduled for weed control under Alternative 6 should be adequate to prevent further infestation of dry shrub, and to permit

reseeding efforts, giving emphasis to native species, on lands dominated by these noxious weeds. Further, no acreage would be scheduled for prescribed fire, which would aid in preventing further spread of these weed species.

Alternative 7 Effectiveness (Dry Shrub, EEIS)

Overall rank: 0.92, at the high end of Low effectiveness.

Effectiveness in preventing further infestation of dry shrub:

Range clusters 2 and 5: Moderate

Range clusters 1, 3, 4, and 6: Poor

Cluster 1 — *Prediction: Further infestation of dry shrub, in reserves and outside reserves.* There are only approximately 41,000 acres (16,599 ha) of dry shrub in this cluster within reserves, with most of it located in the Lost and Goose Lake subbasins within BLM's Lakeview District in southeast Oregon. Medusahead and yellow starthistle are prevalent in these subbasins (4th-field HUCs) and are predicted to continue spreading into dry shrub in reserves. This continued spread would not be attributable to livestock grazing, but perhaps to fire opening up microsites for establishment. The acreage scheduled for weed control outside reserves would not be adequate to prevent spread of diffuse knapweed and other noxious weeds.

Cluster 2 — *Prediction: Some further infestation of dry shrub.* Of dry shrub in this cluster on BLM- and FS-administered lands, 92 percent is the antelope bitterbrush PVT. The antelope bitterbrush PVT is of high susceptibility to invasion by diffuse knapweed, the major noxious weed in this cluster that threatens dry shrub. The IWM emphasis of this alternative outside of the reserves would be the same as Alternative 3; however, within reserves in north-central Washington, where some dry shrub appears to be located, diffuse knapweed would invade and would not be controlled.

Cluster 3 — *Prediction: Further infestation of dry shrub.* Noxious weeds with prevalence in dry shrub in this cluster are whitetop and possibly yellow starthistle. Others, such as diffuse knapweed, squarrose knapweed, and rush skeletonweed, are less extensive at present but could become prevalent in dry shrub in the future. The IWM emphasis of this alternative outside of the reserves would be the same as Alternative 3. Because Alternative 7 would not schedule weed control in reserves, there would be concern in the Powder subbasin. Most of the dry shrub in reserves is located in the Powder subbasin (4th-field HUC), where whitetop is present currently and is possibly already infesting dry shrub. The acreage scheduled for weed control will not prevent the spread of noxious weeds. Diffuse knapweed is quite extensive in this cluster, but its distribution in the cluster overlaps very little with the distribution of the dry shrub.

Cluster 4 — *Prediction: Further infestation of dry shrub, particularly in dry shrub in reserves.* Noxious weeds with prevalence in dry shrub in this cluster are diffuse knapweed, Russian knapweed, dalmatian toadflax, cheatgrass, and potentially yellow starthistle. The IWM emphasis of this alternative outside reserves would be the same as Alternative 3. Of the weeds listed, cheatgrass would be the major target of IWM efforts because dry shrub is of high susceptibility to invasion by cheatgrass. The acreage scheduled for weed control, which is the same as for Alternatives 4 and 6, would be directed to the other weeds listed too, but in somewhat lesser priority compared with cheatgrass.

Outside reserves, it is predicted that further infestation of dry shrub by these weeds would be prevented. In reserves in this cluster, however, where 50 percent of the dry shrub on BLM- and FS-administered lands is located, further infestation of dry shrub is predicted. This prediction is based on the reserves being so fragmented and often surrounded by Other lands.

Cluster 5 — *Prediction: Further infestation of dry shrub, at about the same level as Alternative 5.* Noxious weeds with prevalence in dry shrub in

this cluster include diffuse knapweed, medusahead, halogeton (particularly in the Alvord Lake subbasin), cheatgrass, and possibly rush skeletonweed. Of these, halogeton and cheatgrass are proposed to be the most extensive in land coverage in dry shrub. The IWM emphasis of this alternative outside of reserves would be the same as Alternative 3; however, of the species mentioned, only halogeton would actually be targeted outside reserves. The dry shrub within reserves is mostly found within the Upper Quinn, Middle Owyhee, and East Little Owyhee subbasins, where currently noxious weeds are not prevalent and cheatgrass is not dominant.

The acreage scheduled for weed control would permit further infestation of dry shrub by diffuse knapweed and medusahead. This prediction is of concern in the central Washington portion of this cluster, where extensive acreages of dry shrub on Other lands are currently infested with diffuse knapweed. We assume control of diffuse knapweed would be undertaken on Other lands, but diffuse knapweed from Other lands is still predicted to spread into dry shrub in the vicinity, of which some is in reserves.

Cluster 6 — *Prediction: Further infestation of dry shrub.* Comparing dry shrub in and outside reserves, the prediction is for relatively more rapid infestation of dry shrub in reserves. Noxious weeds with prevalence in dry shrub in this cluster include halogeton, medusahead, Mediterranean sage, cheatgrass, and possibly dalmatian toadflax and rush skeletonweed. It is assumed that the majority of weed acreage in dry shrub is contributed by cheatgrass, medusahead, and Mediterranean sage. The IWM emphasis of this alternative would be the same as Alternative 3, but only outside reserves. Additionally, only half of the problem species listed above would be targeted by IWM; these would include cheatgrass, Mediterranean sage, and halogeton.

In this cluster, there would be concern that the acreages scheduled for weed control would be inadequate to effectively prevent spread of the targeted species, or to control their infestation size.

The dry shrub in reserves is located mostly in the Warner Lakes and Guano subbasins, which already have weed infestations, particularly Mediterranean sage and medusahead. These species are predicted to continue spreading in reserves.

Dry Shrub Potential Vegetation Group (UCRB)

The effectiveness of the alternatives to prevent further infestations of the dry shrub potential vegetation group in the Upper Columbia River Basin EIS area is ranked by range cluster and alternative in table 2.46.

Alternatives 1 and 2 Effectiveness (Dry Shrub, UCRB)

Overall rank: 1.5, which is Moderate.

Effectiveness in preventing further infestation of dry shrub:

Range clusters 2 and 3: High

Range clusters 5 and 6: Poor

The high effectiveness in clusters 2 and 3 was based on the assumption that the acreage scheduled for weed control for these alternatives would be implemented, and also on the presence of very little dry shrub in these two clusters.

The poor rating in clusters 5 and 6 is primarily related to the fragmented manner of noxious weed control proposed in these alternatives which would not prevent further infestation. In particular to Alternative 2, a point needing resolution is the substantive acreages scheduled per decade for weed control in these two clusters; the 130,000 acres (52,632 ha) in cluster 5 and 77,500 acres (31,377 ha) in cluster 6 may exceed actual acreages being implemented on the ground.

Alternative 3 Effectiveness (Dry Shrub, UCRB)

Overall rank: 2.5, which is High.

Effectiveness in preventing further infestation of dry shrub:

Table 2.46 — Rank of the effectiveness of alternatives in controlling noxious weeds and cheatgrass in the dry shrub potential vegetation group by range cluster and alternative (Upper Columbia River Basin).[1]

	Range of Control Effectiveness by Alternative						
Range Cluster	1	2	3	4	5	6	7
2	3	3	3	3	3	3	2
3	3	3	3	3	3	3	3
5	0	0	2.5	3	1	1.5	0.5
6	0	0	1.5	2	0.75	1.25	1
Overall rank	1.5	1.5	2.5	2.75	1.94	2.19	1.62

[1]0-1 = low effectiveness.
1-2 = moderate effectiveness.
2-3 = high effectiveness.

Ranks should not be compared between clusters, but rather more appropriately within a cluster across alternatives.

Range clusters 2, 3, and 5: High

Range cluster 6: Moderate

Clusters 2 and 3 — See discussion for these clusters under Alternative 4.

Cluster 5 — *Prediction: Prevention of further infestation of dry shrub and some reclaiming of dry shrub from weeds by year 100.* Noxious weeds with prevalence in dry shrub in this cluster are yellow starthistle, rush skeletonweed, medusahead, halogeton, and cheatgrass. Compared with Alternative 4, the IWM emphasis of this alternative would not be as strong. Cheatgrass and halogeton will be the species targeted for IWM efforts. However, the acreage scheduled for weed control is predicted to be adequate to permit some weed control of the other species as well. Further, weed control efforts will result in reseeding and rehabilitation of some areas currently dominated by cheatgrass and/or medusahead and other noxious weeds. The emphasis of Alternative 3 in this cluster would be on control (reduction in infestation size), and rehabilitation. The acreage scheduled for "Livestock Management" would be about half that of Alternative 4, which could result in a relatively greater failure rate for seedings and a relatively greater risk of spreading weeds into currently uninfested areas.

Cluster 6 — *Prediction: Some further infestation of dry shrub.* Noxious weeds with prevalence in dry shrub in this cluster are Dyers woad, diffuse knapweed, yellow starthistle, medusahead, rush skeletonweed, and cheatgrass. The IWM emphasis of this alternative would not be as strong in this cluster as in Alternative 4. Also, weed control efforts would specifically target cheatgrass and Dyers woad, resulting in some further infestation of dry shrub by other species. Not emphasizing steps 1 through 4 of IWM would result in lower emphasis on greenstripping, a technique used to prevent further spread of annual grasses into native shrub-steppe vegetation (dry shrub). However, there would be focus in this cluster on reseeding of burned areas that are either presently dominated, or expected to be dominated, by cheatgrass and/or medusahead.

Alternative 4 Effectiveness (Dry Shrub, UCRB)

Overall rank: 2.75, at the high end of High effectiveness.

Effectiveness in preventing further infestation of dry shrub:

Range clusters 2, 3, and 5: High

Range cluster 6: Moderate

Cluster 2 — *Prediction: Prevention of further infestation of dry shrub and some reclaiming of dry shrub from weeds by year 100.* Noxious weeds of some

extent in dry shrub are possibly Mediterranean sage. Within this cluster, there are only approximately 10,000 acres (4,049 ha) of dry shrub on BLM- and FS-administered lands, all of which is the big sagebrush-cool PVT. The acreage scheduled for weed control under Alternative 4 (inconsistency; see rangeland assumption 6) would accommodate control of the weed acreage currently present on this dry shrub.

Cluster 3 — *Prediction: Prevention of further infestation of dry shrub and some reclaiming of dry shrub from weeds by year 100.* Noxious weeds of some extent in dry shrub are possibly Mediterranean sage and leafy spurge. Within this cluster, there are only approximately 3,500 acres (1,417 ha) of dry shrub on BLM- and FS-administered lands, of which 93 percent is the big sagebrush-cool PVT. The acreage scheduled for weed control (inconsistency in cluster 3 for Alternatives 3 and 6; see rangeland assumption 6) would accommodate control of the weed acreage currently present on this dry shrub.

Cluster 5 — *Prediction: Prevention of further infestation of dry shrub and some reclaiming of dry shrub from weeds by year 100.* Noxious weeds with prevalence in dry shrub in this cluster are yellow starthistle, rush skeletonweed, medusahead, halogeton, and cheatgrass. The IWM emphasis of Alternative 4 would be strong, targeting all weed species mentioned. Also, acreage scheduled for weed control would be adequate to reclaim some dry shrub that is currently dominated by cheatgrass, medusahead, or other noxious weeds. The emphasis would be on control (reduction in infestation size) and rehabilitation. The high acreage scheduled for livestock management should help prevent reinvasion of weed-controlled areas.

Cluster 6 — *Prediction: Minor further infestation of dry shrub.* Noxious weeds with prevalence in dry shrub in this cluster are Dyers woad, diffuse knapweed, yellow starthistle, medusahead, rush skeletonweed, and cheatgrass. The IWM emphasis of Alternative 4 would be strong in this cluster, but would emphasize control (reduction in infestation size) rather than prevention of spread and eradication. Cheatgrass and medusahead would be the primary target of weed control efforts because of their prevalence. However, IWM steps 1 through 4 (table 2.42) would not be emphasized under Alternative 4, which would result in low emphasis on greenstripping. This is a technique for preventing further spread of annual grasses into native shrub-steppe vegetation (dry shrub). Reseeding of burned areas that are now dominated by cheatgrass and/or medusahead, or are expected to be dominated by them, would be a focus of weed control acreage in this cluster.

Alternative 5 Effectiveness (Dry Shrub, UCRB)

Overall rank: 1.94, at the high end of Moderate effectiveness.

Effectiveness in preventing further infestation of dry shrub:

Range clusters 2 and 3: High

Range clusters 5 and 6: Poor

Clusters 2 and 3 — See discussion for these clusters under Alternative 4.

Cluster 5 — *Prediction: Further infestation of dry shrub.* Noxious weeds with prevalence in dry shrub in this cluster are yellow starthistle, rush skeletonweed, medusahead, halogeton, and cheatgrass. The IWM emphasis of this alternative in this cluster is stronger than Alternative 3 but the weed control acreage scheduled is much less than in Alternative 3. In addition to having less areas in weed control, this alternative would only target cheatgrass and halogeton. Thus, little weed control would be directed to the other noxious weeds and their spread would continue. Weed control efforts should, however, result in some reseeding and rehabilitation of areas currently dominated by cheatgrass (and medusahead, if present in association with cheatgrass) and halogeton. Some greenstripping will be implemented, with the same emphasis as reseeding and rehabilitation, which will help prevent the spread of annual grasses. Even with these efforts, further spread of noxious weeds into dry shrub would be expected.

Cluster 6 — *Prediction: Further infestation of dry shrub.* Noxious weeds with prevalence in dry shrub in this cluster are Dyers woad, diffuse knapweed, yellow starthistle, medusahead, rush skeletonweed, and cheatgrass. The IWM emphasis of Alternative 5 would not be as strong in this cluster as Alternative 4. Cheatgrass and Dyers woad would be the target of weed control efforts, which would result in some further infestation of dry shrub by the other species. Without an emphases on IWM steps 1 through 4 (table 2.42), there would not be great emphasis on greenstripping. This is a technique for preventing further spread of annual grasses into native shrub-steppe vegetation (dry shrub). Reseeding of burned areas that are now dominated by cheatgrass and/or medusahead, or are expected to be dominated by them, would be a focus of weed control acreage in this cluster.

Alternative 6 Effectiveness (Dry Shrub, UCRB)

Overall rank: 2.19, at the low end of High effectiveness.

Effectiveness in preventing further infestation of dry shrub:

Range clusters 2 and 3: High

Range clusters 5 and 6: Moderate

Clusters 2 and 3 — See discussion for these clusters under Alternative 4.

Cluster 5 — *Prediction: Further infestation of dry shrub.* Noxious weeds with prevalence in dry shrub in this cluster are yellow starthistle, rush skeletonweed, medusahead, halogeton, and cheatgrass. Although the IWM emphasis of this alternative in this cluster would be stronger than Alternative 4, and all weed species mentioned would be targeted, the acreage scheduled for weed control would be one-third that of Alternative 4. The predicted result is that weed management, which in Alternative 6 focuses on control (through reduction in infestation size) and reseeding, would be directed more toward areas where rehabilitation success is judged high. This means that areas in lower precipitation zones would undoubtedly not receive control efforts because rehabilitation success would be less there. The high acreage scheduled for livestock management under Alternative 6, however, should help prevent reinvasion of weed-controlled areas.

Cluster 6 — *Prediction: Some further infestation of dry shrub.* Further infestation would be at a greater level than under Alternative 4. Noxious weeds with prevalence in dry shrub in this cluster are Dyers woad, diffuse knapweed, yellow starthistle, medusahead, rush skeletonweed, and cheatgrass. The IWM emphasis of this alternative would be strong in this cluster, but would emphasize control (through reduction in infestation size) rather than prevention of spread and eradication. The acreage scheduled for weed control, which would be less than Alternative 4, would not prevent further spread of cheatgrass and noxious weeds. Cheatgrass, medusahead, and noxious weeds growing in association with these two species would be targets of weed control efforts. Without emphasis on IWM steps 1 through 4, there would not be high emphasis on greenstripping; this is a technique for preventing further spread of annual grasses into native shrub-steppe vegetation (dry shrub). Reseeding of burned areas that are now dominated by cheatgrass and/or medusahead, or are expected to be dominated by them, would be a focus of weed control acreage in this cluster.

Alternative 7 Effectiveness (Dry Shrub, UCRB)

Overall rank: 1.62, which is Moderate.

Effectiveness in preventing further infestation of dry shrub:

Range cluster 3: High

Range cluster 2: Moderate

Range clusters 5 and 6: Poor

Cluster 2 — *Prediction: Minor further infestation of dry shrub by year 100.* Of the approximately 22,000 acres (8,907 ha) of dry shrub on BLM- and

FS-administered lands in this cluster as a whole, 88 percent is in reserves. Since there is no weed control acreage proposed under this alternative in this cluster, if noxious weeds invade the dry shrub in reserves, eradicating them will be difficult.

Cluster 3 — *Prediction: Prevention of further infestation of dry shrub and, by year 100, some reclaiming of dry shrub.* There are approximately 3,500 acres (1,417 ha) of dry shrub in this cluster. The portion in reserves appears to be in the Lower Salmon subbasin, and is in the big sagebrush-cool PVT; noxious weeds are not prevalent here.

Cluster 5 — *Prediction: Further infestation of dry shrub, particularly in reserves.* Noxious weeds with prevalence in dry shrub in this cluster are yellow starthistle, rush skeletonweed, medusahead, halogeton, and cheatgrass. The IWM emphasis of Alternative 7 would not be as strong in this cluster as in Alternative 4. Cheatgrass and halogeton would be the only species targeted for weed control. These two species are already present in the dry shrub in reserves, a substantive portion of which is located in the Upper Owyhee, Bruneau, and Salmon Falls subbasins. There would be concern in dry shrub in these subbasins regarding the substantial areal extent of clay soils, which make the area susceptible to medusahead invasion and dominance. Outside reserves, the prediction is that the acreage scheduled for weed control will permit minor further infestation of dry shrub.

Outside reserves, weed control efforts of Alternative 7 will result in reseeding and rehabilitation of areas currently dominated by cheatgrass and/or medusahead (if growing in association with cheatgrass). The acreage scheduled for livestock management outside reserves would be adequate to reduce the risk of seeding failures and also reduce the risk of new infestations.

Cluster 6 — *Prediction: Further infestation of dry shrub, particularly in reserves.* The effects of noxious weeds and cheatgrass in this cluster differ, depending largely on whether they lie inside reserves or outside reserves. On reserves, the dry shrub exists primarily in the Lake Walcott and American Falls subbasins, which already have a cheatgrass component that is predicted to remain and spread. Outside reserves, cheatgrass, medusahead, and the other noxious weeds would be controlled somewhat through reductions in infestation size; however, prevention of spread and eradication of small infestations would not be an emphasis of IWM in this alternative.

Cool Shrub Potential Vegetation Group (EEIS)

The effectiveness of the alternatives to prevent further infestations of the cool shrub potential vegetation group in the Eastside EIS area is ranked by range cluster and alternative in table 2.47.

Table 2.47 — Rank of the effectiveness of alternatives in controlling noxious weeds and cheatgrass in the cool shrub potential vegetation group by range cluster and alternative (Eastside EIS).[1]

	Rank of Control Effectiveness by Alternative						
Range Cluster	1	2	3	4	5	6	7
1	0	0	0.75	1.5	0	1.5	0
2	2	2	2	2	2	2	3
3	1.75	1.75	1.75	1.75	2	1.75	2
4	2.5	2.5	2.75	2.75	2.5	2	2.75
5	0.75	0.75	3	2.5	1.75	1.5	2.5
6	0.5	0.5	3	3	3	2.5	2
Overall rank	1.25	1.25	2.21	2.25	1.87	1.87	2.04

[1]0-1 = low effectiveness.
1-2 = moderate effectiveness.
2-3 = high effectiveness.

Ranks should not be compared between clusters, but rather more appropriately within a cluster across alternatives.

Alternatives 1 and 2 Effectiveness (Cool Shrub, EEIS)

Overall rank: 1.25, at the low end of Moderate effectiveness.

Effectiveness in preventing further infestation of cool shrub:

Range cluster 4: High

Range clusters 2 and 3: Moderate

Range clusters 1, 5, and 6: Poor

In clusters 1, 5, and 6, noxious weed control under these alternatives would be continuation of the present approach. This approach is fragmented and does not prevent further infestation of cool shrub by noxious weeds. Although acreage scheduled for weed control would be minor in cluster 4, this cluster has a minor amount of cool shrub and a negligible noxious weed problem that warrants a high rank of effectiveness.

Although clusters 2 and 3 do not have an extensive noxious weed problem in cool shrub, both clusters could be further infested (attributable to no acreage being scheduled for weed control).

Alternative 3 Effectiveness (Cool Shrub, EEIS)

Overall rank: 2.21, at the low end of High effectiveness.

Effectiveness in preventing further infestation of cool shrub:

Range clusters 4, 5, and 6: High

Range clusters 2 and 3: Moderate

Range cluster 1: Poor

Cluster 1 — *Prediction: Further infestation of cool shrub.* The extent of the additional infestation in this cluster would be more than in Alternative 4. In the Eastside EIS area, cluster 1 has arguably the most extensive noxious weed problem within the cool shrub PVG. Noxious weeds with prevalence in cool shrub are diffuse knapweed, yellow starthistle, leafy spurge, and medusahead. The IWM emphasis of Alternative 3, however, would not be directed to any of these species for weed control efforts because PVTs within the cool shrub PVG are not of high susceptibility to invasion by these species. However, the assumption is that the acreage scheduled for weed control would be directed first to the high disturbance areas such as roads near cool shrub, probably to yellow starthistle and diffuse knapweed, and second to control of medusahead and leafy spurge. Given the rapid spread rates of diffuse knapweed and yellow starthistle particularly, and the relatively large acreage of medusahead in this cluster on BLM- and FS-administered lands, the acreage scheduled for weed control would not prevent these species from spreading.

Medusahead is often located in the understory of western juniper woodlands in this cluster. Western juniper woodlands in this cluster are a priority for treatment particularly by burning. Much of the approximately 67,500 acres (27,328 ha) of prescribed burning proposed per decade for this alternative in this cluster is assumed to be prioritized to western juniper; this level would be less than in Alternative 4. There is some expectation that prescribed burning of western juniper woodlands would mostly be undertaken on areas where medusahead does not dominate the understory. Prescribed burning of western juniper woodlands where medusahead is present could result in either: (1) a decline in medusahead density, at least temporarily, if burning were implemented at medusahead's vulnerable phenological stage; or (2) an opening of new areas to potential invasion by medusahead and perhaps the other noxious weed species. It is assumed, however, that prescribed burning would be applied judiciously so that medusahead spread would not be promoted.

Clusters 2 and 4 — See discussion for these clusters under Alternative 4.

Cluster 3 — See discussion for cluster 3 under Alternative 4. The only difference here is that this alternative would schedule a very minor acreage for weed control (inconsistency; see rangeland assumption 6).

Cluster 5 — *Prediction: Prevention of further infestation of cool shrub and, by year 100, some reclaiming of cool shrub.* Noxious weeds with prevalence in the cool shrub in this cluster are medusahead, and possibly rush skeletonweed, tansy ragwort, and diffuse knapweed. Leafy spurge is not yet a problem in cool shrub in this cluster, but is predicted to be in the future and would require control efforts.

Although the thrust of this alternative in regard to IWM is not as strong as in alternative 4, the acreage scheduled for weed control is greater than alternative 4. Because no PVTs in the cool shrub PVGs are labeled of high susceptibility to invasions by any weeds in this cluster, the target of weed control efforts would not include any of the problematic weeds listed above. However, the assumption is that the acreage scheduled would target medusahead, which is the major problem weed in this cluster. The IWM steps 5 to 7 focus efforts on control (reduction in infestation size) and reseeding after initial weed control, and these efforts would be prioritized to medusahead-infested areas. Even with these efforts, eliminating medusahead from cool shrub areas is not feasible at present; however, reseeding with native or "desired" exotic species could result in reintroducing these species to the areas.

It was assumed that the 140,000 acres (56,680 ha) scheduled for prescribed burning per decade would be applied judiciously, particularly in areas having cool shrub and clayey soils known to be susceptible to medusahead invasion. Another assumption was that some of this prescribed burning would be directed at controlling medusahead in preparation for reseeding efforts.

Cluster 6 — *Prediction: Prevention of further infestation in cool shrub and reclaiming of some cool shrub by year 100.* Noxious weeds with prevalence in cool shrub in this cluster are medusahead, leafy spurge, cheatgrass, and possibly diffuse knapweed and tansy ragwort. The IWM emphasis of Alternative 3 would not be as strong as Alternative 4, and only cheatgrass of the five weeds listed would be a priority for weed control efforts. However, medusahead, which is often found in proximity to or in association with cheatgrass, is also expected to receive weed control efforts.

The acreage scheduled for weed control would permit control (reduction in infestation size) of medusahead and cheatgrass. Seeding would be an emphasis after initial weed control, particularly in the drier portions. Control of medusahead and cheatgrass in preparation for seeding was assumed to require prescribed burning, and the proposed 135,000 acres (54,656 ha) of prescribed burning per decade would be adequate for this purpose. Leafy spurge and the other weeds listed would probably infest cool shrub, but cool shrub in total is predicted to increase.

Alternative 4 Effectiveness (Cool Shrub, EEIS)

Overall rank: 2.25, at the low end of High effectiveness.

Effectiveness in preventing further infestation of cool shrub:

Range clusters 4, 5, and 6: High

Range clusters 1, 2, and 3: Moderate

Cluster 1 — *Prediction: Further infestation of cool shrub.* In the Eastside EIS area, this cluster has arguably the most extensive noxious weed problem within the cool shrub PVG. Noxious weeds with prevalence in cool shrub in this cluster are diffuse knapweed, yellow starthistle, leafy spurge, and medusahead. These species would be the priority for weed control efforts under this alternative. Given the rapid spread rates of diffuse knapweed and yellow starthistle particularly, and the relatively large acreage of medusahead in this cluster on BLM- and FS-administered lands, the acreage scheduled for weed control would not prevent these species from spreading.

Medusahead is often located in the understory of western juniper woodlands in this cluster. These woodlands would be a priority for treatment, particularly by burning; it is assumed that much of the 110,000 acres (44,534 ha) of prescribed

burning per decade under Alternative 4 would be targeted to western juniper. There is some expectation that areas where medusahead does not dominate the understory would be the target of most prescribed burning of western juniper woodlands. Prescribed burning of western juniper woodlands where medusahead is present could result in either: (1) a decline in medusahead density, at least temporarily, if the burning were implemented at the vulnerable phenological stage of medusahead; or (2) an opening of new areas to potential invasion by medusahead and perhaps the other noxious weed species. It is assumed, however, that prescribed burning would be applied judiciously so that medusahead spread would not be promoted.

Cluster 2 — *Prediction: Minor further infestation of cool shrub.* The noxious weed infestation of cool shrub in this cluster is predicted to be negligible at the present time, and there is no acreage scheduled for weed control under this alternative. There is concern that diffuse knapweed in central Washington could, or possibly already has, establish and spread along roads near cool shrub. Without any weed control, diffuse knapweed would spread.

Cluster 3 — *Prediction: Minor further infestation of cool shrub.* Noxious weeds proposed as infesting some cool shrub in this cluster are tansy ragwort, whitetop, diffuse knapweed, leafy spurge, and medusahead. Although not listed in appendix 2L table 2L.3, medusahead is suspected to be present on cool shrub in this cluster, particularly in the Powder subbasin where there is substantial clay soil that overlaps the distribution of cool shrub. Based on current information, however, the acreage of cool shrub infested by these weeds is low. Given that no acreage is proposed for weed control for Alternative 4 in this cluster, weeds that are present will spread.

Cluster 4 — *Prediction: Prevention of further infestation of cool shrub and some reclaiming of cool shrub by year 100.* There is presently little noxious weed problem in cool shrub in this cluster, and additionally, only approximately 12,400 acres (5,020 ha) of cool shrub are in this cluster. Most of the cool shrub in this cluster is in the BLM's Spokane District. Although the level of acreage scheduled for weed control in cool shrub would be minor in Alternative 4 (inconsistency; see rangeland assumption 6), it should be adequate to prevent further infestation.

Cluster 5 — *Prediction: Prevention of further infestation of cool shrub and some reclaiming of cool shrub by year 100.* Noxious weeds with prevalence in cool shrub in this cluster are medusahead, and possibly rush skeletonweed, tansy ragwort, and diffuse knapweed. Although not yet a problem in this cluster's cool shrub, leafy spurge is predicted to be present in the future and would require control efforts. The acreage scheduled for weed control is predicted to be targeted to medusahead, the major problem weed here. The IWM emphasis of this alternative would be strong, with control (reduction in infestation size) and reseeding after initial weed control priorities for medusahead-infested areas. Although eliminating medusahead from cool shrub areas is not presently feasible, reseeding with native or "desired" exotic species could result in reintroduction of these species into the areas.

It is assumed that the 142,500 acres (57,692 ha) scheduled per decade for prescribed burning would be applied judiciously, particularly in areas having cool shrub with clayey soils known to be susceptible to medusahead invasion. Another assumption is that some of this prescribed burning would be used to control medusahead in preparation for reseeding efforts.

Cluster 6 — *Prediction: Prevention of further infestation of cool shrub and reclaiming of some cool shrub by year 100.* Noxious weeds with prevalence in cool shrub in this cluster are medusahead, leafy spurge, cheatgrass, and possibly diffuse knapweed and tansy ragwort. The IWM emphasis of Alternative 4 would be strong and the acreage scheduled for weed control sufficient to control medusahead and cheatgrass and the other weeds listed. Seeding would be an emphasis after initial weed control, particularly in the drier portions, where the majority of weed acreage is expected to be located. The 132,500 acres (53,644 ha) of pre-

scribed burning proposed per decade would be adequate to control medusahead and cheatgrass in preparation for reseeding.

Alternative 5 Effectiveness (Cool Shrub, EEIS)

Overall rank: 1.87, at the high end of Moderate effectiveness.

Effectiveness in preventing further infestation of cool shrub:

Range clusters 4 and 6: High

Range clusters 2, 3, and 5: Moderate

Range cluster 1: Poor

Cluster 1 — *Prediction: Further infestation of cool shrub.* The extent of further infestation would be greater than in Alternative 3. In the Eastside EIS area, this cluster has arguably the most extensive noxious weed problem within cool shrub. Noxious weeds with prevalence in cool shrub are diffuse knapweed, yellow starthistle, leafy spurge, and medusahead. None of these species would be the target of weed control efforts because PVTs in the cool shrub PVG are not of high susceptibility to invasion by any of these species.

Two assumptions for this alternative and cluster were that: (1) the acreage scheduled for weed control would be directed primarily to the high disturbance areas such as roads near cool shrub, probably to yellow starthistle and diffuse knapweed; and (2) not much weed control acreage would be targeted to medusahead and leafy spurge. Given the rapid spread rates of diffuse knapweed and yellow starthistle particularly, and the relatively large acreage of medusahead in this cluster on BLM- and FS-administered lands, the acreage scheduled for weed control would not prevent these species from spreading.

Medusahead is often located in the understory of western juniper woodlands in this cluster. These woodlands would be a priority for treatment, particularly burning. It was assumed that much of the 45,000 acres (18,219 ha) of prescribed burning scheduled per decade for Alternative 5 would target western juniper; this level of prescribed burning would be less than in Alternative 3. There is some expectation that prescribed burning of western juniper woodlands would mostly be undertaken on areas where medusahead does not dominate the understory. Prescribed burning of western juniper woodlands where medusahead is present could result in either: (1) a decline in medusahead density, at least temporarily, if the burning were implemented at medusahead's vulnerable phenological stage; or (2) an opening of new areas to potential invasion by medusahead and perhaps the other noxious weed species. It was assumed, however, that prescribed burning would be applied judiciously so that medusahead spread would not be promoted.

Cluster 2 — *Prediction: Minor further infestation of cool shrub.* The noxious weed infestation of cool shrub in this cluster is predicted to be negligible at the present time, and no acreage would be scheduled for weed control in this cluster under Alternative 5. The concern is that diffuse knapweed in central Washington could, or possibly already has, established and spread along roads near cool shrub. Without any weed control, diffuse knapweed would spread.

Cluster 3 — *Prediction: Minor further infestation of cool shrub.* The acreage scheduled for weed control in this cluster would be greater in this alternative than with any other alternative (inconsistency; see rangeland assumption 6). Additional information on this cluster is included under Alternative 4.

It is assumed that the acreage scheduled for weed control (inconsistency; see rangeland assumption 6) would be directed primarily to high disturbance areas such as roads in the proximity of cool shrub. If necessary, some acreage would be directed to reseeding of medusahead-infested cool shrub, even though there are no PVTs within the cool shrub PVG that are of high susceptibility to invasion by medusahead.

Cluster 4 — See discussion for this cluster under Alternative 4.

Cluster 5 — *Prediction: Further infestation of cool shrub.* Further infestation would be at a slightly slower rate than in Alternative 6. The species that particularly would contribute to the increase would be medusahead. Additional information about this cluster is provided under Alternative 6.

The IWM emphasis of this alternative would not place priority on weed control of any of the weed species listed for this cluster in cool shrub, but the scheduled weed control acreage is assumed to be targeted to medusahead.

Cluster 6 — See discussion for this cluster under Alternative 3.

The prescribed burning acreage of 100,000 acres (40,486 ha) per decade would be slightly less than in Alternative 3, but still predicted as adequate for control of medusahead and cheatgrass in preparation for seeding efforts.

Alternative 6 Effectiveness (Cool Shrub, EEIS)

Overall rank: 1.87, at the high end of Moderate effectiveness.

Effectiveness in preventing further infestation of cool shrub:

Range cluster 6: High

Range clusters 1 through 5: Moderate

Cluster 1 — See discussion for this cluster under Alternative 4, which would be similar except Alternative 6 would schedule a slightly greater level of prescribed burning [about 117,500 acres (47,571 ha) per decade].

Clusters 2 and 3 — See discussion for these clusters under Alternative 4.

Cluster 4 — *Prediction: Minor further infestation of cool shrub.* There would essentially be no weed control scheduled for this cluster under this alternative. The fragmented nature of the BLM- and FS-administered lands in the cool shrub in this cluster, and their close proximity to Other lands, makes them a greater risk for noxious weed invasion. Also, the lack of livestock management in this cluster would not support maintaining a vigorous stand of vegetation that would resist weed invasion. For additional information about this cluster, see its discussion under Alternative 4.

Cluster 5 — *Prediction: Further infestation of cool shrub, particularly by medusahead.* Noxious weeds with prevalence in cool shrub in this cluster are medusahead, and possibly rush skeletonweed, tansy ragwort, and diffuse knapweed. Although not a problem yet in cool shrub in this cluster, leafy spurge may invade in the future, in which case infestations would require control efforts.

The acreage scheduled for weed control under Alternative 6 is predicted to be targeted to medusahead, the major problem weed in this cluster. However, the level of control projected for medusahead would not curtail its spread and infestation size. Although eliminating medusahead from cool shrub areas is not presently feasible, reseeding with native or "desired" exotic species could reintroduce these species into medusahead-infested areas. It is assumed that the 142,500 acres (57,692 ha) scheduled for prescribed burning per decade would be applied judiciously, particularly in areas having cool shrub on clayey soils known to be susceptible to medusahead invasion. A further assumption is that some prescribed burning would be used to control medusahead in preparation for reseeding efforts.

Cluster 6 — *Prediction: Some reclaiming of cool shrub from weeds by year 100.* Noxious weeds with prevalence in cool shrub in this cluster are medusahead, leafy spurge, cheatgrass, and possibly diffuse knapweed and tansy ragwort. The IWM emphasis of this alternative in this cluster would be as strong as in Alternative 4. The acreage scheduled for weed control, however, would be less than Alternative 4 and targeted toward control (reduction in infestation size) of medusahead, cheatgrass, and the other weeds listed. The reduction in weed acreage attributable to control and seeding is expected to outpace the increase in weed acreage attributable to spread, but not to the same extent as in Alternative 4. Some cool shrub

would be reclaimed, but on less acreage than for Alternative 4. Seeding, particularly in the drier portions, would be an emphasis after initial weed control. The 130,000 acres (52,632 ha) of prescribed burning scheduled per decade under Alternative 6 would be adequate for the control assumed to be needed for medusahead and cheatgrass in preparation for seeding.

Alternative 7 Effectiveness (Cool Shrub, EEIS)

Overall rank: 2.04, at the low end of High effectiveness.

Effectiveness in preventing further infestation of cool shrub:

Range clusters 2, 4, and 5: High

Range clusters 3 and 6: Moderate

Range cluster 1: Poor

Cluster 1 — *Prediction: Further infestation of cool shrub.* Of approximately 887,000 acres (359,109 ha) of cool shrub in this cluster as a whole, only 6 percent or approximately 51,700 acres (20,931 ha), would be in reserves. The acreage scheduled for weed control in Alternative 7 would be roughly one-half that of Alternative 3, but would be directed to roughly the same land mass because nearly all the cool shrub is located outside reserves. Much of the cool shrub in reserves is located in the Lost and Goose Lake subbasins, which are strongly suspected of already having medusahead invasion due to their clayey soils and the known presence of medusahead in those HUCs.

Cluster 2 — *Prediction: Prevention of further infestation of cool shrub by year 100 and reclaiming of some cool shrub that is currently infested.* Approximately 96 percent of the approximately 91,000 acres (36,842 ha) of cool shrub in this cluster for both EIS areas is in reserves. The high amount in reserves and the very minor noxious weed problem in cool shrub in the Eastside EIS portion of this cluster would help prevent further infestations. An assumption in this cluster is that disturbances in reserves that would enhance the spread of weeds would be minor, and also any species in the reserves such as diffuse knapweed would not spread appreciably, even along roads. The minor amount scheduled for weed control outside reserves (inconsistency; see rangeland assumption 6) should be effective in reducing noxious weed extents because there is very little cool shrub outside reserves.

Cluster 3 — *Prediction: Minor further infestation of cool shrub.* Some cool shrub in this cluster in the Eastside EIS portion is in reserves, particularly in the Little Deschutes subbasin. There is concern in this subbasin relative to diffuse knapweed and its potential for invasion and spread along existing roads in the area. Outside reserves, the acreage scheduled for weed control (inconsistency; see rangeland assumption 6) would probably be targeted to high disturbance areas near cool shrub and to medusahead, if necessary.

Cluster 4 — *Prediction: Prevention of further infestation of cool shrub and some reclaiming of cool shrub by year 100.* Approximately 64 percent of the approximately 12,400 acres (5,020 ha) of cool shrub on BLM- and FS-administered lands in this cluster would be in reserves. There is not, presently, a noxious weed problem known in this cool shrub area. The acreage scheduled for weed control, although minor (inconsistency; see rangeland assumption 6), should prevent further spread of any noxious weeds outside reserves.

Cluster 5 — *Prediction: Prevention of further infestation of cool shrub and some reclaiming of cool shrub by year 100.* The cool shrub within reserves in the Eastside EIS portion of this cluster is primarily the mountain big sagebrush-mesic-west PVT and is mostly located in the Middle Owyhee subbasin. This area does not presently have much of a noxious weed problem. Noxious weeds with prevalence in cool shrub in this cluster are medusahead and possibly rush skeletonweed, tansy ragwort, and diffuse knapweed. Although not a problem yet in cool shrub in this cluster, leafy spurge will be present in the future and would require control efforts. No PVTs with-

in the cool shrub PVG are of high susceptibility to invasion by the weeds listed in this cluster, so the weeds listed above would not be the target of weed control efforts. However, it was assumed that any weed control acreage scheduled would be targeted to medusahead, which is the major problem weed in this cluster outside reserves. Control (reduction in infestation size) and reseeding after initial weed control would be priorities for medusahead-infested areas. Although eliminating medusahead from cool shrub areas is not presently feasible, reseeding with native or "desired" exotic species could result in reintroducing these species to the areas.

It is assumed that the 150,000 acres (60,729 ha) scheduled for prescribed burning per decade would be applied judiciously, particularly relative to cool shrub on clayey soils known to be susceptible to medusahead invasion. Another assumption was that some prescribed burning would be used to control medusahead in preparation for reseeding efforts.

Cluster 6 — *Prediction: Minor further infestation of cool shrub.* There is almost negligible cool shrub in reserves in this cluster on the Eastside EIS area. Therefore, almost all of this cluster's cool shrub is outside reserves, and weed control then would be roughly at the same level as in Alternative 3. The acreage scheduled for weed control, however, would be less than in Alternative 3. The predicted result of this level of weed management would be some control (reduction in infestation size) of cheatgrass and medusahead, but an increase in extent of other noxious weeds. The end result would be a slight increase in cool shrub that is infested with noxious weeds by year 100.

Cool Shrub Potential Vegetation Group (UCRB)

The effectiveness of the alternatives to prevent further infestations of the cool shrub potential vegetation group in the Upper Columbia River Basin EIS area is ranked by range cluster and alternative on table 2.48.

Alternatives 1 and 2 Effectiveness (Cool Shrub, UCRB)

Overall rank: 0.75, which is Low.

Effectiveness in preventing further infestation of cool shrub:

Range clusters 2, 3, 5, and 6: Poor

In clusters 5 and 6, the manner of controlling noxious weeds in these alternatives would be to continue the present approach which is fragmented and does not prevent further infestation of cool shrub by noxious weeds.

Table 2.48 — Rank of the effectiveness of alternatives in controlling noxious weeds and cheatgrass in the cool shrub potential vegetation group by range cluster and alternative (Upper Columbia River Basin).[1]

	Rank of Control Effectiveness by Alternative						
Range Cluster	1	2	3	4	5	6	7
2	1	1	2	2	2	2	2.5
3	1	1	1.5	1.5	1.75	1.5	1.5
5	0.5	0.5	2.75	2.5	0.75	0	2.25
6	0.5	0.5	2	2.25	1.5	1.75	1.75
Overall rank	0.75	0.75	2.06	2.06	1.5	1.31	2

[1]0-1 = low effectiveness.
1-2 = moderate effectiveness.
2-3 = high effectiveness.

Ranks should not be compared between clusters, but rather more appropriately within a cluster across alternatives.

Although current noxious weed infestations are of limited extent in clusters 2 and 3, the lack of any acreage for weed control would permit the continued spread of noxious weeds.

Alternative 3 Effectiveness (Cool Shrub, UCRB)

Overall rank: 2.06, at the low end of High effectiveness.

Effectiveness in preventing further infestation of cool shrub:

Range cluster 5: High

Range clusters 2, 3, and 6: Moderate

Cluster 2 — *Prediction: Minor further infestation of cool shrub.* Although the noxious weed extent in this cluster is quite minimal, noxious weeds of concern in cool shrub are thought to be spotted knapweed and leafy spurge. Further infestation, although minor, would occur in these clusters as a result of no acreage being scheduled for weed control under Alternative 3.

Cluster 3 — *Prediction: Further infestation of cool shrub.* Noxious weeds with prevalence in cool shrub in this cluster are proposed as spotted knapweed, leafy spurge, and possibly common crupina. Available information indicates that the noxious weed extent is minor on the approximately 55,000 acres (22,267 ha) of cool shrub on BLM- and FS-administered land in the Upper Columbia River Basin portion of this cluster. Since no weed control would be scheduled in Cluster 3 under Alternative 3, no attempts would be made to prevent the spread of the three species mentioned.

Cluster 5 — *Prediction: Prevention of further infestation of cool shrub and some reclaiming of cool shrub by year 100.* Noxious weeds with prevalence on cool shrub in this cluster are medusahead, leafy spurge, and possibly rush skeletonweed and spotted knapweed. The IWM emphasis of Alternative 3 in this cluster would not prioritize weed control efforts to any of these species, because the PVTs in the cool shrub PVG are only moderately susceptible to invasion by the listed species. Although weed control acreage would be scheduled, it is assumed the efforts would be directed to all species, but particularly medusahead and leafy spurge. In effect, the large acreage scheduled under Alternative 3 for weed control would tend to overshadow the relatively weak IWM emphasis in this cluster. Emphasis in weed control would be placed on control (reduction in infestation size) and reseeding of medusahead-infested areas after initial weed control.

About 337,500 acres (136,640 ha) scheduled for prescribed burning per decade would be directed to mountain big sagebrush-dominated areas. As mentioned below for cluster 6, there is some expectation that burning of mountain big sagebrush, depending on its proximity to the weed species listed, will enhance noxious weed spread because microsites for establishment would become available.

Cluster 6 — *Prediction: Minor further infestation of cool shrub.* Noxious weeds with some extent on cool shrub in this cluster are leafy spurge, Dyers woad, medusahead, cheatgrass, and possibly rush skeletonweed, diffuse knapweed, and spotted knapweed. The acreage scheduled for weed control would be prioritized in Alternative 3 to Dyers woad, because PVTs in the cool shrub PVG are of high susceptibility to invasion by Dyers woad. Weed control efforts would not be targeted to the other species mentioned on cool shrub. However, it is assumed that some acreage, above the level used for Dyers woad, could be directed toward the other species.

A concern is that leafy spurge is present and is probably the toughest to control of all weeds listed above. Without an emphasis on leafy spurge, its potential to spread is great. Because more than one weed control effort is typically necessary for leafy spurge control, the available acreage for control of leafy spurge would need to be directed toward the same piece of ground in consecutive years.

Prescribed burning in Alternative 3 in cool shrub is about 62,500 acres (25,304 ha) per decade. It is expected that burning of mountain big sagebrush,

depending on its proximity to the weed species listed, would enhance noxious weed spread by making microsites available for its establishment.

Alternative 4 Effectiveness (Cool Shrub, UCRB)

Overall rank: 2.06, at the low end of High effectiveness.

Effectiveness in preventing further infestation of cool shrub:

Range clusters 5 and 6: High

Range clusters 2 and 3: Moderate

Clusters 2 and 3 — See discussion for these clusters under Alternative 3.

Cluster 5 — *Prediction: Prevention of further infestation of cool shrub and some reclaiming of cool shrub by year 100.* Noxious weeds of major concern on cool shrub in this cluster are medusahead, leafy spurge, and possibly rush skeletonweed and spotted knapweed. The IWM emphasis of Alternative 4 would permit directing control efforts to all species above, which would be a stronger emphasis than Alternative 3. However, the acreage scheduled for weed control under Alternative 4 would be only two-thirds that of Alternative 3. Because IWM steps 5 through 7 are emphasized, reducing the infestation size of medusahead and leafy spurge would be of greater priority than preventing spread of these species.

The above level of emphasis is expected to result in some reclaiming of cool shrub because the control rate is expected to slowly outpace the spread of noxious weeds.

About 342,500 acres (138,664 ha) scheduled for prescribed burning per decade would be directed to areas dominated by mountain big sagebrush. As mentioned below for cluster 6, there is some expectation that burning of mountain big sagebrush, depending on its proximity to the weed establishment would become available.

Cluster 6 — *Prediction: Prevention of further infestation and some reclaiming of cool shrub by year 100.* Noxious weeds with prevalence on cool shrub in this cluster are leafy spurge, Dyers woad, medusahead, cheatgrass, and possibly rush skeletonweed, diffuse knapweed, and spotted knapweed. Although the IWM emphasis of Alternative 4 would permit the acreage scheduled for weed control to be targeted to all these species, the most likely targets were assumed to be leafy spurge, medusahead, and Dyers woad. Some weed control acreage would need to be directed to reseeding of medusahead-infested areas after initial weed control.

The toughest weed to control of the seven listed above may be leafy spurge, which is of some concern because it is already present in cluster 6, although believed to be in minor amounts on cool shrub. Because more than one weed control effort is typically necessary for leafy spurge control, the available acreage targeting leafy spurge would need to be directed toward the same land area in consecutive years.

In Alternative 4, approximately 70,000 acres (28,340 ha) of prescribed burning would be scheduled per decade in cool shrub. Depending on its proximity to the weed species listed, burning of mountain big sagebrush could enhance noxious weed spread by making microsites available for its establishment.

Some weed control acreage would need to be directed to reseeding of medusahead-infested areas in post-control.

Alternative 5 Effectiveness (Cool Shrub, UCRB)

Overall rank: 1.5, which is Moderate.

Effectiveness in preventing further infestation of cool shrub:

Range clusters 2, 3, and 6: Moderate

Range cluster 5: Poor

Cluster 2 — *Prediction: Minor further infestation of cool shrub.* Although the noxious weed extent in this cool shrub in this cluster is quite minimal, noxious weeds of proposed importance are spotted

knapweed and leafy spurge. The further infestation is related to the almost negligible acreage (inconsistency; see rangeland assumption 6) that would be scheduled for weed control under Alternative 5.

Cluster 3 — *Prediction: Minor further infestation of cool shrub.* See discussion for this cluster under Alternative 3, which would be similar. There would be more acreage scheduled for weed control in Alternative 5 than in the other alternatives for this cluster (inconsistency; see rangeland assumption 6).

Cluster 5 — *Prediction: Further infestation of cool shrub.* Noxious weeds with prevalence on cool shrub in this cluster are medusahead, leafy spurge, and possibly rush skeletonweed and spotted knapweed. The IWM emphasis of Alternative 5 would not target weed control efforts to any of the species listed, because the PVTs in the cool shrub PVG are only of moderate susceptibility to invasion by these species. The acreage scheduled for weed control would likely be directed first towards high disturbance areas near cool shrub, and then towards prevention of spread and eradication of infestations in these high disturbance areas. Any remaining available acreage could be directed to actual infestations of the above listed species within cool shrub.

Cluster 6 — *Prediction: Further infestation of cool shrub.* The rate of infestation would be more rapid than in Alternative 3. Reference that alternative for further information on this cluster. In this cluster, Alternative 5 differs from Alternative 3 by having: (1) much less acreage directed to livestock management [77,500 acres (31,377 ha) per decade compared with 220,000 acres (89,069 ha) in Alternative 3](inconsistency; see rangeland assumption 6), and (2) much less acreage directed to prescribed burning [25,000 acres (10,122 ha) per decade compared with 70,000 acres (28,340 ha) in Alternative 3].

The results of having less acreage in livestock management are more rapid spread of noxious weeds in cool shrub compared with Alternative 3, and possibly greater risk of reinvasion by noxious weeds after initial weed control. The result of having less acreage in prescribed burning is perhaps less rapid spread of noxious weeds, such as leafy spurge, compared with Alternative 3.

Alternative 6 Effectiveness (Cool Shrub, UCRB)

Overall rank: 1.31, at the low end of Moderate effectiveness.

Effectiveness in preventing further infestation of cool shrub:

Range clusters 2, 3, and 6: Moderate

Range cluster 5: Poor

Clusters 2 and 3 — See discussion for these clusters under Alternative 3.

Cluster 5 — *Prediction: Further infestation of cool shrub, particularly by medusahead and leafy spurge.* Although the IWM emphasis of this alternative would permit weed control efforts to be directed to all noxious weeds listed for this cluster, the acreage would only allow targeting medusahead and leafy spurge. The acreages of control scheduled, however, would not be sufficient to effectively prevent the spread of these two species.

Cluster 6 — *Prediction: Minor further infestation of cool shrub.* See discussion for this cluster under Alternative 4 for more information. Acreage scheduled for weed control would be much less in this cluster than in Alternative 4; also, more spread of noxious weeds is predicted under this alternative. The acreage scheduled for prescribed burning in both alternatives would be almost the same.

Alternative 7 Effectiveness (Cool Shrub, UCRB)

Overall rank: 2, at the high end of Moderate effectiveness.

Effectiveness in preventing further infestation of cool shrub:

Range clusters 2 and 5: High

Range clusters 3 and 6: Moderate

Cluster 2 — *Prediction: Prevention of further infestation of cool shrub and some reclaiming of cool shrub by year 100.* Approximately 96 percent of the cool shrub on BLM- and FS-administered lands within this cluster in both EIS areas is in reserves. Whatever noxious weeds are within these reserves are not expected to spread much; further, the spread of noxious weeds on cool shrub outside reserves would be prevented.

Cluster 3 — *Prediction: Further infestation of cool shrub.* There would be acreage scheduled under Alternative 7 for weed control outside reserves, but of an almost negligible amount (inconsistency; see rangeland assumption 6).

Cluster 5 — *Prediction: Prevention of further infestation of cool shrub and some reclaiming of cool shrub by year 100.* Most of the cool shrub within reserves is in southwest Idaho, which does not yet have a major problem with medusahead and other noxious weeds in cool shrub. There is concern, however, that medusahead could become more extensive in this area of cool shrub in reserves due to a prevalence of clay soils in portions of that area. The acreage scheduled for weed control under Alternative 7 is expected to result in control (reduction in infestation size) of medusahead and leafy spurge and reseeding of medusahead-infested areas.

Cluster 6 — *Prediction: Minor further infestation of cool shrub.* There are approximately 474,000 acres (191,903 ha) of cool shrub in reserves in this cluster for both EIS areas, nearly all of which are in the Upper Columbia River Basin EIS area. Given available information, leafy spurge is not proposed as extensive yet in this cool shrub in reserves. However, concern exists for potential invasion of this cool shrub in reserves by leafy spurge and medusahead due to the prevalence of clayey soils in the area that would be in reserves.

Although the acreage scheduled for weed control outside reserves would be directed to Dyers woad only, the assumption is made that not all 30,000 acres (191,903 ha) per decade would be directed to Dyers woad, but that some could be directed to the other species. This would include reseeding of medusahead-infested areas after initial weed control.

Summary and Synthesis of Landscape Findings

Results and Discussion

Two key management issues surface from our evaluation of alternatives relative to management of forest and rangelands on the BLM- and FS-administered lands of the Interior Columbia River Basin and portions of the Klamath and Great Basins, for the Eastside EIS assessment area and the Upper Columbia River Basin EIS assessment area. A discussion of these issues follows.

Forests

In forested environments, a large amount of contiguous mid- and late-seral, dense, multi-layer forest communities exist in both EIS areas. These areas generally occur on the foothill and lower relief mountains where road networks have been relatively easy to develop. Consequently, much of this condition occurs in areas of high road density where the large, shade-intolerant, insect-, disease- and fire-resistant species have been harvested over the past 20 to 30 years. Historically, these areas had a high component of surface fire (nonlethal) disturbance regimes, which maintained relatively open-canopy, late-seral, single-layer, old forests. We find these areas to be highly correlated with areas of high lightning ignition potential and moderate-to-high urban/wildland interface. Many of these areas are in critical fall big game range where a common objective is to maintain multi-layer, dense, forest cover for big game security. The occurrence of high intensity crown fires of large size has been common and will increase in the future as the mid- and late-seral forest patches grow into similar structures.

Substantial areas also occur with mid- and late-seral, dense, multi-layer forest communities in areas of low road density where the large, shade-intolerant, insect- and disease- and fire-resistant species have not been harvested. This typically occurs in the steeper mountains where extensive road networks have not been developed and the environments are not as dry as in the roaded areas. Historically, a mix of surface, mixed, and crown (nonlethal, mixed, and lethal, respectively) fire disturbance regimes maintained a patchwork of: open-canopy, late-seral, single-layer, old forests on the benches and ridges; late-seral, multi-layer, old forests on the footslopes and benches; and early- to mid-seral forests on the slopes. These areas are typically correlated with moderate to high lightning ignition potential and low urban and wildland interface. The occurrence of high intensity crown fires of large size has been common in these areas and will increase in the future.

The primary difference between the landscape dynamics in the unroaded areas and the roaded areas is that the forest vegetation has higher opportunity for relatively rapid shift to native patterns in the unroaded areas because the large shade-intolerant trees are still present. Fires in unroaded areas are not as severe as in the roaded areas because of less surface fuel, and after fires at least some of the large trees survive to produce seed that regenerates the area. Many of the fires in the unroaded areas produce a forest structure that is consistent with the fire regime, while the fires in the roaded areas commonly produce a forest structure that is not in sync with the fire regime. Fires in the roaded forests commonly are more intense, due to drier conditions, wind zones on the foothill/valley interface, high surface-fuel loading, and dense stands. The effects of these fires often cause serious erosion, nutrient loss, slumps and stream sediment hazards, when combined with high road densities.

In modeling the alternatives we did not find an alternative that substantially changed the trend of these conditions. Alternatives 4 and 6 generally reduce the growth of these conditions and the amount of wildfire more than Alternatives 3, 5, and 7, and more than Alternatives 1 and 2. Within Alternatives 4 and 6, there is flexibility to prioritize the activity levels to high risk subbasins and subwatersheds using hierarchical analysis in order to reverse these conditions.

In the evaluation of management activities and other disturbances found in the previous sections on "Evaluation of Landscape Disturbances" and "Vegetation Response and Disturbance Patterns," we found that the historical fire disturbance regime generally disturbed about 30 percent of the vegetation per decade. In comparing the alternatives to this historical disturbance level, we found that the restoration alternatives were very similar in amounts. The reader might conclude that if the BLM and FS were to implement a similar level of disturbance as the historical system, the result would be restoration of landscape patterns within a short period. This is not the case. The current condition is the result of about 50 years of somewhat successful fire exclusion and about 30 years of harvest techniques that did not mimic landscape disturbance regimes. The landscape patterns are on a very different trajectory than one consistent with the biophysical system and inherent disturbance regime. Consequently, to affect restoration at a large scale, the BLM and FS would need to maintain a well-designed 30 percent disturbance level, and focus additional restoration energy to reverse the changes that have already occurred.

In general, the subbasins that have landscape conditions with high departure from the biophysical regime also have aquatic conditions in need of restoration. Priority for vegetation, road, fuel and watershed restoration could be focused on subbasins and subwatersheds that do not have conflicts with remnant (stronghold) native fish populations.

In considering the adaptive management approach of Alternative 6, we would like to emphasize that the slower rates of activities and need for technology development and research definitely apply to the unroaded steeper mountain areas. There is high risk to watershed capabilities from further road development in these areas. In general, the effects of wildfires in these areas are much lower and do not result in the chronic sediment delivery hazards exhibited in areas that have been roaded. In contrast, the already roaded areas have high potential for restoration action.

As the reader reviews the fire disturbance information in the "Management and Disturbances" section, we would like to emphasize that the amount and intensity of fires in the roaded forests with the conditions previously described may be substantially underestimated. There was not adequate time in this evaluation to model the mid-scale contagion effects of insect, disease, and stress mortality on forests, or the contagion effects of fire on fire size and amount, and to extrapolate to the broad scale. The amount of fire will likely be much greater than projected and of larger average size within the coming decades. Alternatives 4 and 6 have high potential to eventually turn these conditions around. However, to accomplish substantial improvement of these conditions within the next 10 to 20 years, BLM and FS management would prioritize the high risk areas and focus restoration energy in those subbasins and subwatersheds, rather than evenly distribute restoration energy across the forest and range cluster restoration emphasis areas.

Rangeland

In the range and dry forest potential vegetation groups the amount of exotic herbland in the current period is underestimated. The probability of increase of exotics for these different potential vegetation groups within the alternative simulation models is also underestimated. Consequently, it is likely that the evaluation of alternatives relative to response and effects of exotic herblands reports a more positive situation than exists. The integrated weed management strategy in Chapter 3 of the preliminary draft EISs is a very sound strategy for rangelands. It is also applicable to forests, but would require further analysis.

There is a large amount of contiguous exotic herbs in both EIS areas. Much of this is along roadsides and trails, around watering areas, and in areas with historic excessive livestock grazing effects. Much of the exotic herbs also appear to be correlated with stream and river corridors. The two areas of largest size are suspected to occur in the Snake River Plains area of the Upper Columbia River Basin EIS area, and in the south central

Oregon area of the Eastside EIS area. These areas are generally in the dry shrub potential vegetation group, with low annual precipitation. In these environments wildfires tend to increase the rate of spread of the exotic herbs.

Given concern with potential underestimation of exotic herb rates of spread and the results of the simulations of the alternatives, we feel there is high potential that there is no alternative that will assure the recovery of rangelands in the dry environments. There is also high potential for continued spread of exotic herbs in the forest environments as a result of road disturbance and traditional soil disturbing harvest, fuel management, site preparation, and stand improvement activities.

Alternatives 4 and 6 generally appear to stabilize or possibly reduce the growth of these conditions and the amount of wildfire more than Alternatives 3, 5, and 7, and much more than Alternatives 1 and 2. Within Alternatives 4 and 6, there is flexibility to refocus the activity levels to a smaller group of subbasins and subwatersheds to reverse these conditions in subbasins with the highest priority.

In general, the subbasins that have the most problems with exotic herbs do not have substantial conflicts with aquatic conditions. Priority for range management can be focused on range plan revisions and implementation along with restoration activities to achieve objectives. For most of the landscape objectives in the alternatives that relate to range, stocking reductions alone do not address the issues. Range plan revision and implementation, along with range improvements and prescribed fire, to produce a system that is consistent with the biophysical system and inherent disturbance regime will best sustain landscape integrity.

In considering the adaptive management approach of Alternative 6, we emphasize that the need for technology development and research applies to recovery of rangelands in the dry shrub and dry grass potential vegetation groups and in the riparian systems. There is high risk that our current level of activities and types of control and containment treatments will not be adequate.

Summary of Response

Succession/Disturbance Regime

Evaluation of management activities and other disturbances indicated that the historical disturbance regime generally disturbed about 30 percent of the vegetation per decade. For a general summary of disturbance, we used a classification of succession/disturbance regimes (Hann and others 1997) that is presented in table 2.49.

The short-cycle regime currently occurs at high levels on roads and areas of exotic annual grasses and other herbs. In the historical regime this short cycle system generally only occurred in bank areas of flood plains and earth flow patches. At this scale the opportunity with Alternatives 4 and 6 appears to be to restore and mitigate roads and contain the spread of exotics. With the current technology there appears to be a fairly low probability of achieving substantial recovery of what has already changed to domination by exotic herbs without further advances in technology.

The predominant occurrence of the moderate cycle regime was in the shrublands and on the steeper, drier sites in the forest. Currently, there is a low amount of this regime in comparison to the historical regime. Much of the sagebrush zone has converted to a short cycle regime and the forest zone has converted to a long- or very-long-cycle regime. Alternatives 4 and 6 have the highest potential to reestablish these landscape level succession/disturbance regimes.

Through fire suppression, fire has been excluded from many forest habitats that were moderate cycle or maintenance systems. The ability to suppress wildfire is steadily declining as fuel loading increases, the probability of human ignition increases in urban/wildland interface zones, and the probability of consecutive year drought increases. Consequently, the fuel conditions will eventually transition to a level consistent with the biophysical regime, due to either wildfire or management treatments.

Table 2.49 — Succession and disturbance regimes developed for broad-scale assessment.

Regime (Code)	Average Disturbance Interval (years): Intermediate Mixed[1]/ Non-lethal[2]	Average Disturbance Interval (years): Lethal	Disturbance Severity	Description	Examples
Cycling	NA[3]	1+	Moderate-High	Succession is reinitiated by disturbances that are lethal[4] to most or all of the upper-layer and some or all of the lower-layer vegetation.	
Accelerated Cycle (AC)	5 - 50	30 - 300	Moderate	Intermediate disturbances that accelerate growth of disturbance-adapted species, often creating an irregular fine-scale mosaic of patches of different vegetation structures. Eventually cycled by a lethal disturbance.	Conifer potential vegetation types (PVTs) with non-lethal or mixed fires, insect, or disease effects that thin the stands of susceptible species, allowing the resistant species to accelerate growth; shrub PVTs with non-lethal or mixed fires, insects, disease, grazing, or beaver cutting effects that open-up stands.
Long Cycle (LC)	NA	101 - 300	High	Successional cycle is long, with reinitiation from seedlings and some resprouting. Intermediate disturbances may happen but they have minimal effects on composition, structure, and density.	Conifer PVTs with longer-lived, fast-growing, shade-intolerant, conifer species that dominate after crown fires, insect attacks, windthrow, or other lethal effects that cycle the community.
Moderate Cycle (MC)	NA	5 - 100	Moderate	Successional cycle is moderately long, with reinitiation from a mixture of resprouting plants and seedlings. Intermediate disturbances may happen but they have minimal effects on composition, structure, and density.	Shrub PVTs where succession after lethal burning, herbicide application, chaining, or insect topkill takes from 10 to 25 years to reestablish the dominant shrub layer; conifer or broadleaf PVTs with short-lived, fast-growing, shade-intolerant, conifer or broadleaf species that dominate after crown fires, insect attacks, windthrow, or other lethal effects that cycle the community; floods in flood-plain areas that cycle broadleaf, conifer, or shrub vegetation; cutting or flooding by beaver in riparian areas; avalanche paths; conifer PVTs where lethal disturbance cycles the vegetation prior to dominance by conifers, keeping the system in an herb or shrub dominated stage.

Table 2.49 (continued)

Regime (Code)	Average Disturbance Interval (years): Intermediate Mixed[1]/ Non-lethal[2]	Average Disturbance Interval (years): Lethal	Disturbance Severity	Description	Examples
Retrogressive Cycle (RC)	NA	10 - 50	Low	Disturbances that reverse successional direction to an earlier seral stage, typically an annual or biennial cycle of grazing stress insect/ pathogen mortality, drought mortality, or pollutant mortality.	Conifer PVTs with fire exclusion resulting in a dense upper layer that undergoes relatively little annual mortality from insects, disease, and stress that cumulatively are a lethal effect to the dominant vegetation over a long period (10-50 yrs); grazing that selectively causes mortality in relatively small annual increments such that over a long period there is a complete change in dominant vegetation composition or structure; invasion by exotic plants that can compete more effectively than native plants due to environment or disturbance (grazing, fire, tillage, or roads).
Short Cycle (SC)	NA	1 - 4	High	Successional cycle is very short with a composition of new seedlings, annuals, biennials, or weedy perennial species.	Annual high water in floodplain/draw area adjacent to the channel; annual tillage in agriculture; soil or gravel surfaced roads with annual grading and runoff; annual grass and weed dominated vegetation with high amounts of bare soil; annual avalanche path areas.
Very Long Cycle (VC)	NA	301+	High	Successional cycle is very long, with reinitiation primarily from seedlings. Intermediate disturbances may happen but they have minimal effects on composition, structure, and density.	Conifer PVTs with a sequence of dominance by shade-intolerant tree species that succeed to shade-tolerant tree species and then are cycled by crown fires, insect attacks, windthrow, or other lethal effects on the dominant upper layer vegetation.

Table 2.49 (continued)

Regime (Code)	Average Disturbance Interval (years): Intermediate Mixed[1]/ Non-lethal[2]	Average Disturbance Interval (years): Lethal	Disturbance Severity	Description	Examples
Maintenance	5 - 50	NA	Low	Succession is maintained in one structural stage by periodic disturbances that do not cycle the upper-layer vegetation but are lethal to species in the lower layer that would grow up into, and change the upper layer.	
Frequent Maintenance (FM)	5 - 25	NA	Low	Intermediate effects produce relatively uniform upper and lower layers of vegetation with relatively short intervals between maintenance (M) disturbances.	Warm conifer PVTs with non-lethal fires, insects, disease, or grazing effects that selectively remove the susceptible understory species allowing for recruitment of resistant species into the overstory; warm grassland, shrubland, and conifer PVTs with non-lethal and mixed fires, insects, disease, or grazing effects that maintain the dominant grass or forb vegetation.
Less Frequent Maintenance (GM)	26 - 50	NA	Low	Intermediate effects produce relatively uniform upper and lower layers of vegetation with moderate intervals between disturbances.	Cooler conifer PVTs with non-lethal fires, insects, disease, or grazing effects that selectively remove the susceptible understory species allowing for recruitment of resistant species into the overstory; cooler grassland, shrubland, and conifer PVTs with non-lethal and mixed fires, insects, disease, or grazing effects that maintain the dominant grass or forb vegetation.
Irregular Maintenance (IM)	26 - 50	NA	Low	Intermediate effects produce relatively irregular upper layers of vegetation and multiple lower layers.	Wet conifer, broadleaf, or shrub PVTs with mixed fires, insects, disease, or grazing effects that selectively remove small patches of susceptible species in any vegetative layer allowing for recruitment of resistant species into the structure.

[1]Mixed disturbances maintain a salt and pepper, fine-scale mosaic within a patch by cycling clumps and gaps; mixed disturbances leave patches intact, but maintain a rough textural pattern of clumps and gaps; mixed disturbances can be lethal (maintaining scattered gaps or creating gaps); or non-lethal (creating gaps that are intermingled with clumps).

[2]Non-lethal disturbances do not cycle the upper layer of vegetation; non-lethal disturbances selectively thin susceptible plants in all layers of the patch.

[3]NA = Not Applicable.

[4]Lethal disturbances cycle the upper layer of vegetation in the patch, and may cycle the lower layers.

The maintenance system was historically common in grasslands, open woodlands, and park-like forests. There has been a substantial decline in this regime from the historical system. Much of this system has converted to a long cycle regime via fire exclusion, short cycle via exotics, or retrogression via livestock grazing. Without substantial restoration energy, this regime cannot be recovered. In general, Alternatives 3, 4 and 6 are the only alternatives that have the level of restoration activities to change the amounts of this regime in a pattern consistent with the biophysical system. In subbasins that have a mosaic of forest, range, and riparian the native regime fire interval is typically the same across all three types of vegetation. Reduction of fine grass fuels from summer livestock grazing often has a substantial effect on mosaic burns in these types.

The acceleration regime was historically common in forest potential vegetation groups. These types of insect, disease, and fire disturbance thinned the vegetation and accelerated the development of surviving trees into the late-seral stage. Much of this affected area has shifted to a retrogression regime, where the upper layer of vegetation becomes stressed due to high density, and shifts to an earlier seral stage via mortality of the upper layer.

The retrogression regime, which was not common historically, is now common in the range potential vegetation groups as a result of excessive livestock grazing and invasion of exotic perennials. It is also common in the mid- and late-seral forest where stands are more susceptible to insect, disease, and fire because of past harvest activities and fire exclusion.

Projected fire, smoke, and associated conditions on BLM- and FS-administered lands of the UCRB and EEIS were compared by alternative (table 2.50). The general findings follow those in the sections on "Evaluation of Landscape Disturbances," "Terrestrial Communities," and "Vegetation Response and Disturbances." Of particular importance in this evaluation is the high potential for large wildfire events in the rural and wildland interface areas of the Alternative 7 reserves. Given the fuel conditions and the narrow west to east width of many of the reserves, there is very high potential for wildfires to be blown out of the reserves by a wind event and onto private lands or into the interface with urban or rural housing. Modeling of fire-event size indicated that only the four largest reserve areas (North Cascades, Bob Marshal Complex, Selway-Bitterroot, Frank Church River of No Return) would contain 10- to 20-year type wildfire or large unplanned prescribed natural fire events,[1] and that no areas were large enough for 30- to 100-year type events.

[1]Event type is a set of combined fire, weather and fuel conditions.

Table 2.50 — Relative response by alternative of fire and smoke conditions on BLM- and FS-administered lands.

	Alternative						
Item	1	2	3	4	5	6	7
Wildfire	M	M	M	L	M	L	M
Prescribed Fire	L	L	M	H	M	M	L
Spring Smoke	H	H	H	M	H	M	L
Summer Smoke	M	M	M	M	M	M	H
Fall Smoke	L	L	L	M	L	M	H
Large Wild Fire Events Rural / Wildland Interface	M	H	M	L	M	L	H
Risk of Escape Prescribed Fire	M	H	M	L	M	L	H
Fire Management Suppression Cost	M	H	M	L	M	L	H
Potential Accidents	M	H	M	L	M	L	H

L = Low; M = Moderate; H = High.

Vegetation Change

Detailed information on vegetation response is provided in the sections "Terrestrial Communities," and "Vegetation Response and Disturbance."

Detailed discussions of broad-scale and community vegetation structure and composition comparisons of alternatives are also presented (see "Vegetation Response and Disturbance"). A general summary of fine-scale habitat responses compared between alternatives based on interaction of alternative theme, DFCS, and standards is provided in table 2.51.

The comparison of alternatives for snags, down wood, forest riparian, range riparian, and down woody debris in streams is based on the broad-scale vegetation response and the prescription assumptions concerning treatment of these fine-scale features. In general, Alternatives 4, 6, and to some degree Alternative 7, would provide for the highest improved trend of these fine-scale habitat attributes.

Pattern emphasis may be the most important emphasis of an alternative that is related to landscape integrity. Much of the current vegetation is not in a location consistent with the landscape disturbance regime. For instance, many current late-seral multi-layer communities are located on steep slopes with crown fire (lethal) regimes. Historically, and based on the biophysical template of conditions, these structures should be located on moist footslope landforms where creeping, spotting type fires occur. The widespread effect of traditional management, which has changed the juxtaposition of patch structure, has created landscapes in very high risk of large contiguous disturbance events. When wildfire disturbance events happen during consecutive drought years in these types of conditions, they often have high-severity effects on the soil surface that cause high mortality to plants and increase the hazard of hydrophobic conditions and soil erosion. None of the alternatives address this important issue to any degree. Based on the theme, desired future conditions, and the standards (appendix I), it appears that Alternatives 4

Table 2.51 — Habitat responses within the Upper Columbia River Basin and Eastside EIS, by alternative based on CRBSUM prescriptions.

	Alternative						
Habitat Variable	1	2	3	4	5	6	7
Snags	N(--)	L(-)	M(0)	H(+)	M(0)	H(++)	M(+)
Down wood - upland	N(--)	L(--)	M(-)	H(+)	M(-)	H(++)	M(0)
Forest riparian	L(--)	H(+)	M(+)	H(++)	M(+)	H(++)	H(+)
Range riparian	L(--)	M(-)	M(0)	H(++)	M(0)	H(+)	M(0)
Down wood - riparian	N(--)	M(0)	H(+)	H(+)	M(0)	H(++)	H(+)
Pattern Emphasis	N(--)	N(--)	M(-)	H(++)	M(-)	H(+)	LM(-)

Landscape level response across all ownerships of the Basin. Response relative to emphasis on conservation of existing habitats, and recruitment of future habitats. The rating pertains to the aggregate of types of management (traditional or ecological) and disturbance treatments (prescriptions - Rx).
H = High; M = Moderate; L = Low.

Trend, current to future.
0 stable projected trend, current to future.
\+ upward projected trend, current to future.
\- downward projected trend, current to future.

Snags, down wood upland, and down wood - riparian based on lookup tables generated from subsample photo interpretation and plot data, and modeled by prescription (Rx) type. Forest riparian and range riparian based on estimate from DEIS theme and DFCs and correlate trends with upland types from the alternative CRBSUM simulations.
Pattern based on estimate from DEIS theme and DFCs.

and 6 would have the highest likelihood of shifting patterns of landscapes to be more consistent with the system and inherent disturbance processes.

Consistency of Standards

Some of the standards were found to be inconsistent relative to ecological relationships. A brief discussion follows with discussion relative to possible resolution.

Dead Standing and Down Wood Fuel, Soil Productivity, and Habitats — In the alternatives, the brief discussion on the amounts and size of down wood fuel compared to down wood for habitats or soil productivity, is inconsistent within the same alternatives. To resolve these inconsistencies, a modeling approach could be used that links relationships of standing-and-down wood with fire, terrestrial habitats, aquatic habitats, and soil productivity. In general, the literature on standing and down wood from these different perspectives is in conflict and we can easily understand why the EIS team specialists from fire, wildlife, aquatics, and soils were not able to resolve the standards based on the published literature.

There are other single state/size default standards in the preliminary draft EIS (such as riparian buffers). Our evaluation of effects of alternatives 3, 4, 5, 6, and 7 was based on the assumption that these standards would be revised to fit ecological relationships within the first decade.

Landscape Integrity Summary Ratings

In this chapter's introduction, we made some assumptions about the type of management that would provide the most positive trends for landscape integrity on public lands (table 2.52). These estimates are in general agreement with the more detailed findings that have already been presented. An integrated rating of the ability of alternatives to restore and sustain landscape integrity results in Alternative 4 having the highest rating. Although the adaptive management approach of Alternative 6 is very valuable in developing technology to restore altered systems, the slower rate of restora-

Table 2.52 — Summary comparison rating of how well various alternatives achieve the landscape assumptions.

	Alternative						
Landscape Management	1	2	3	4	5	6	7
Landscape Approach Assumption	L	L	M	H	M	H	M
Successful Ability to Mimic Conditions/ Represent Processes	L	L	L	M	L	H	L
Hierarchical Assessment, Implementation, Monitoring, and Evaluation	L	L	L	H	L	H	M
Prioritization and Integration of Activities	L	L	L	H	M	H	L
Concentration of Activities Temporally and Spatially	L	L	M	H	M	H	M
Road Management	L	L	M	H	L	H	M
Fire Management	L	L	M	H	M	H	L
Forest and Range Integrated Landscape Management	L	L	M	M	L	H	L
Woodland PVG	L	L	M	H	L	M	L
Dry and Moist Forest PVGs	L	L	M	H	M	M	L
Cold Forest PVGs	L	L	L	H	L	M	L
Dry Grass, Dry Shrub, and Cool Shrub PVGs	L	L	M	H	M	M	L
Riparian PVGs	M	M	M	H	M	H	M
Alpine PVG	M	M	M	H	M	H	M

L = Low; M = Moderate; H = High.

tion activities results in somewhat high risk of wildfire in forests and of exotic plant invasion in rangelands. Consequently, Alternative 6 is ranked second amongst the alternatives, followed by Alternatives 3, 7, and 5, respectively. Although the reserve approach of Alternative 7 would be valuable to landscape integrity if actively managed for native patterns, the traditional reserve management approach results in high risk to landscape integrity. Because of the lack of a landscape approach and restoration emphasis, Alternatives 1 and 2 are rated well below any of the action alternatives (3 through 7).

Simulations Compared to Alternative Management Activities

The simulated combined forest management activities are within or very close to the range given in Chapter 3 of both the preliminary draft EISs for all alternatives. Alternative 2 is slightly low because of lower than desired prescribed fire and thinning, but harvest is slightly high so they could be exchanged (table 2.53 and figures 2.81 and 2.82). Alternative 3 is a little high because of higher levels of simulated prescribed fire than desired. However, this can be exchanged to increase low levels of simulated thinning. Alternative 7 is slightly high for the EEIS area because of higher simulated than desired harvest in the non-reserve areas, but this can be exchanged to increase low levels of simulated thinning.

Simulated rangeland combined-management activities are within or very close to the range given in Chapter 3 of both preliminary draft EISs for all alternatives. Alternatives 1 and 2 are low for the UCRB area because of a low simulation of prescribed fire and range vegetation improvements (table 2.54 and figures 2.83 and 2.84). However, this may be an actual effect when considering the low level of current range management budgets, compared to the expectations of the forest and resource plans. Alternative 2 is somewhat low for the UCRB EIS area for reasons similar to Alternative 1. Alternatives 3, 4, 5 and 6 in the EEIS area are high because of higher levels of simulated prescribed fire than desired from the preliminary

Table 2.53 — Forest vegetation management and prescribed fire for first decade.

EIS Area	Alternative	Preliminary Draft EIS, Minimum	Simulation Activities	Preliminary Draft EIS, Maximum
			Hectares[2]	
EEIS[1]	1	796,000	894,000	107,1000
	2	563,000	530,000	757,000
	3	997,000	1,424,000	1,350,000
	4	1,246,000	1,418,000	1,688,000
	5	1,042,000	1,386,000	1,411,000
	6	1,111,000	1,378,000	1,500,000
	7	609,000	858,000	820,000
UCRB[1]	1	926,000	994,000	1,254,000
	2	608,000	536,000	825,000
	3	1,083,000	1,733,000	1,467,000
	4	1,369,000	1,672,000	1,850,000
	5	1,118,000	1,132,000	1,512,000
	6	1,082,000	1,427,000	1,467,000
	7	717,000	730,000	972,000

[1]EEIS = Eastside EIS area.
UCRB = Upper Columbia River Basin EIS area.

[2]Rounded to nearest thousand; includes harvest, thinning and prescribed fire (planned and unplanned ignitions).

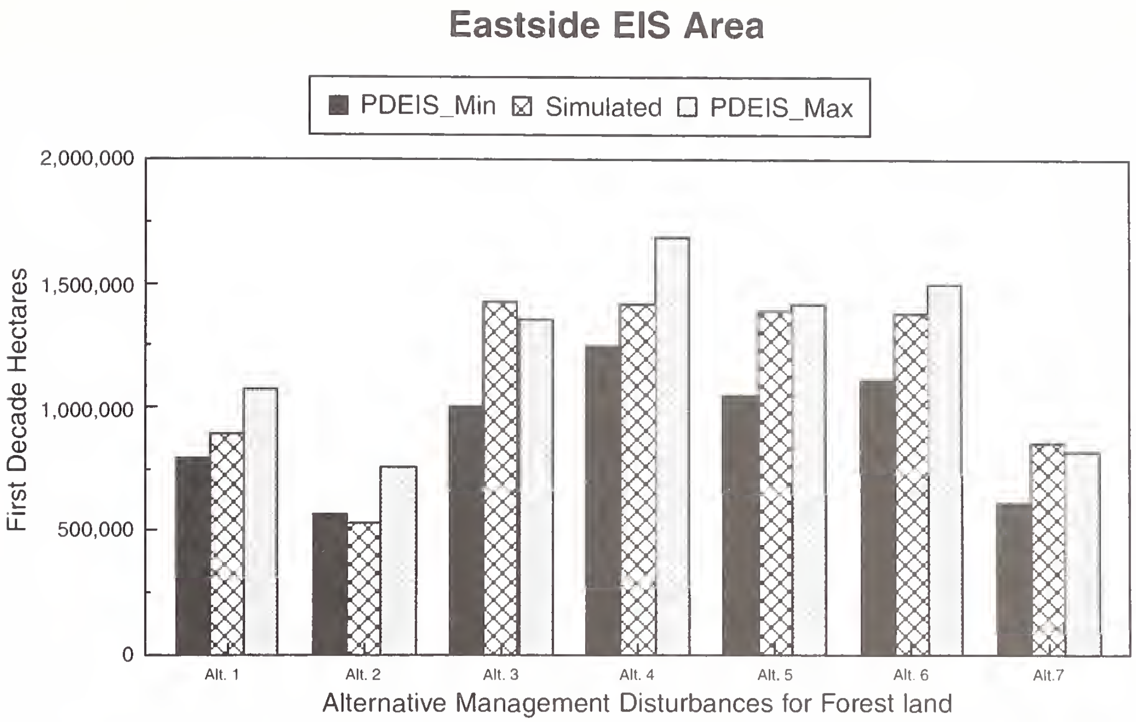


Figure 2.81 — Simulation compared with alternative management activities for BLM- and FS-administered forest land of the EEIS.

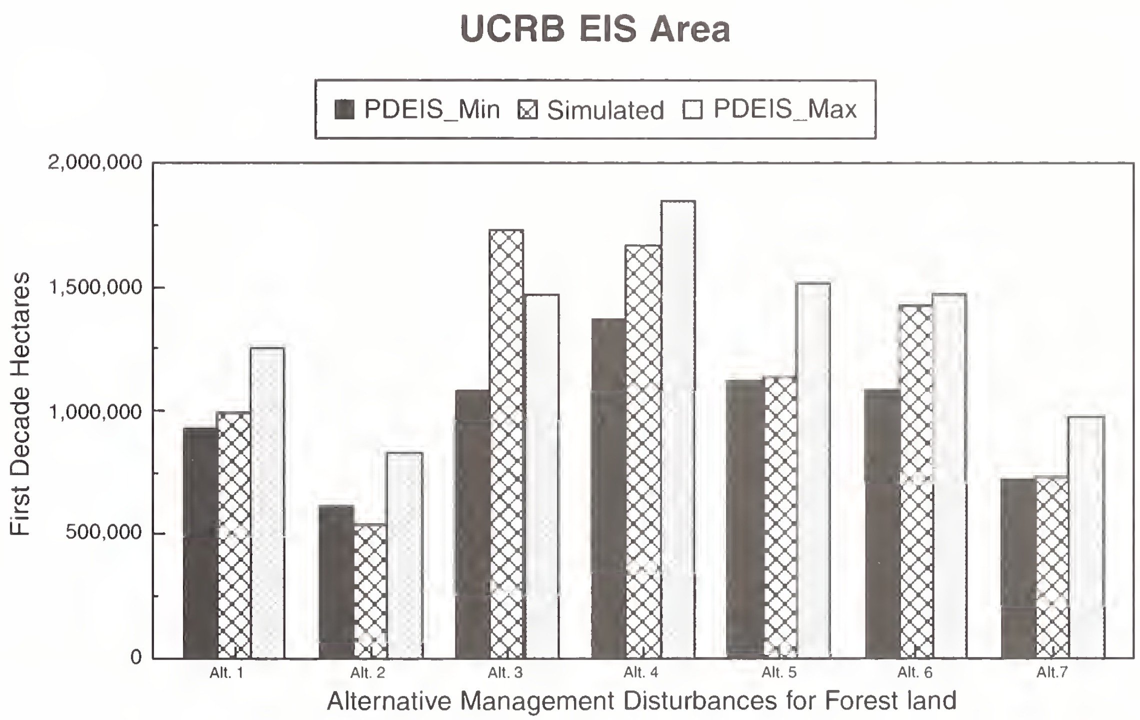


Figure 2.82 — Simulation compared with alternative management activities for BLM- and FS-administered forest land of the UCRB.

draft EIS Chapter 3 activity levels. We feel the preliminary draft EISs underestimated these levels given the amount of decadent shrublands, and woodland and conifer encroachment, in the EEIS area; and that the simulated level better reflects the DFCs and themes of Alternatives 3 and 4 than the Chapter 3 activity levels.

Relative to these critical variables, Alternatives 4 and 6 have the highest ability, Alternatives 3, 7 and 5 moderate ability, and Alternatives 1 and 2 the lowest ability, to transition landscapes toward consistency with their biophysical regime and inherent landscape disturbance processes; thus conserving or improving ecosystem integrity. *We emphasize again, however, that at the broad- and mid-scales, it is not the amount of management activity by area that drives landscape response, but the design, rate of implementation, spatial pattern, and timing of treatments within and across years that are the critical variables.*

Terrestrial Communities

We would recommend that any future analysis of broad-scale communities as terrestrial habitats use the physiognomic type groups stratified potential vegetation group (PVG) or, for a coarser grouping, by forest and rangeland. The changing nature of lower montane, montane, subalpine and non-forest terrestrial communities in relation to existing vegetation cover types with no tie to the biophysical environment is a substantial hindrance to this analysis. Without the tie to the biophysical environment little inference can be made relative to temperature, moisture, soils, terrain, or consistency of the terrestrial communities with the biophysical system and inherent succession and disturbance processes.

Table 2.54 — Rangeland improvements and prescribed fire activities for first decade.

EIS Area	Alternative	Preliminary Draft EIS, Minimum	Simulation Activities	Preliminary Draft EIS EIS, Maximum	Assumed[1] AMP Revision/ Implementation
		Hectares[3]			
EEIS[2]	1	170,000	171,000	227,000	200,000
	2	170,000	225,000	227,000	500,000
	3	412,000	729,000	558,000	500,000
	4	535,000	941,000	720,000	1,000,000
	5	310,000	643,000	418,000	500,000
	6	385,000	799,000	522,000	1,000,000
	7	220,000	565,000	298,000	200,000
UCRB[2]	1	192,000	128,000	261,000	250,000
	2	192,000	150,000	261,000	550,000
	3	518,000	532,000	700,000	600,000
	4	589,000	639,000	795,000	1,200,000
	5	277,000	308,000	374,000	750,000
	6	744,000	345,000	1,004,000	1,200,000
	7	295,000	133,000	401,000	400,000

[1]Assumed for simulation purposes; not in preliminary draft EIS Chapter 3.
[2]EEIS = Eastside EIS area.
UCRB = Upper Columbia River Basin EIS area.
[3]Rounded to nearest thousand; includes structural and nonstructural range improvements plus prescribed fire (planned and unplanned ignitions).

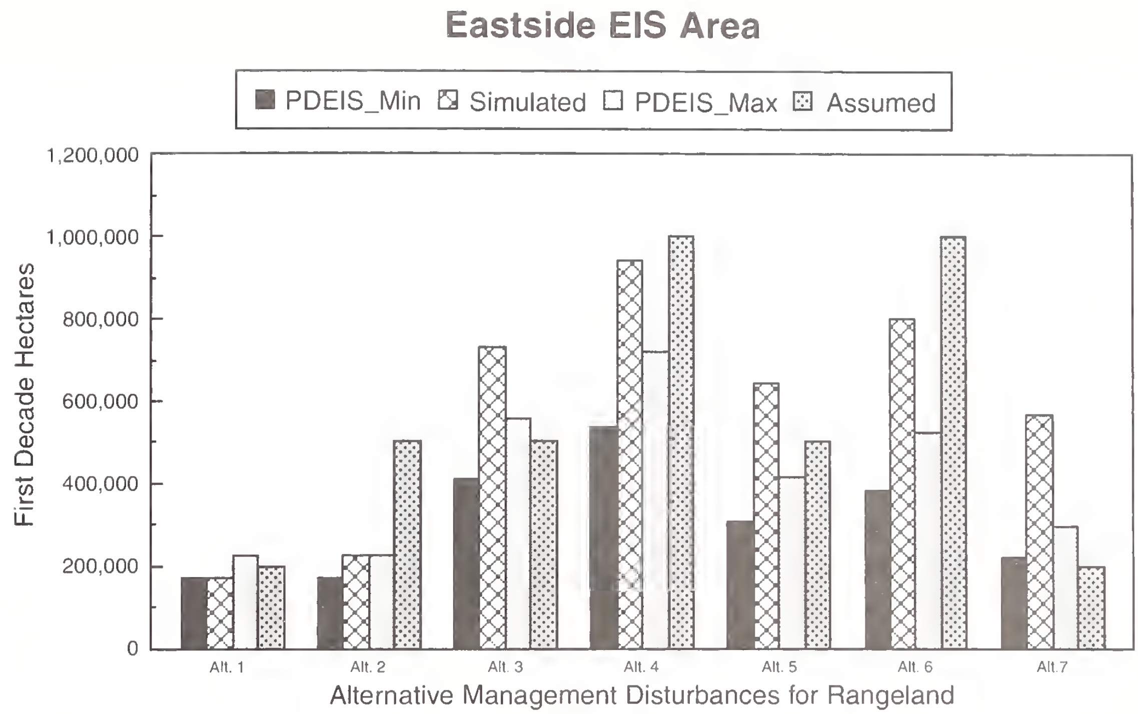


Figure 2.83 — Simulation compared with alternative management activities for BLM- and FS-administered rangeland of the EEIS.

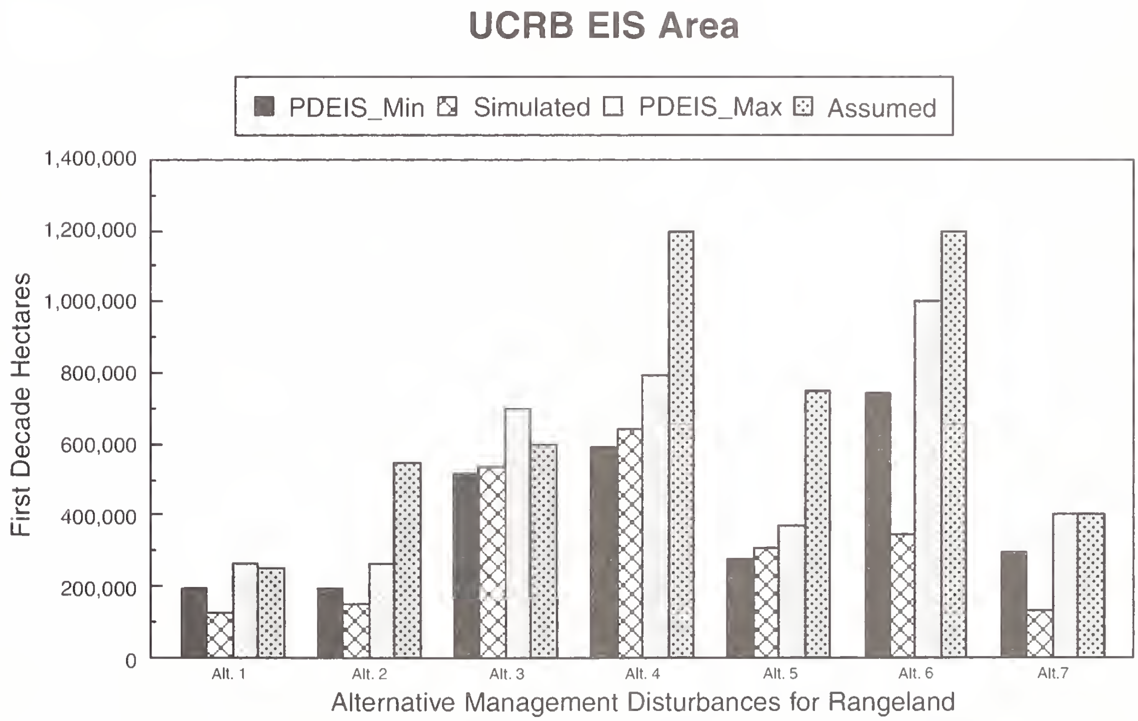


Figure 2.84 — Simulation compared with alternative management activities for BLM- and FS-administered rangeland of the UCRB.

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We express our thanks to all those who worked on the landscape assessment since they provided the platform for this evaluation of alternatives as well as assisting in its evolution.

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Appendix 2-A

Potential Vegetation Groups

This appendix describes the landscape approach to managing potential vegetation groups (PVGs). It includes brief statements about current conditions that serve as a basis for comparing a landscape management approach to traditional approaches. Current conditions of the Basin have been documented in Landscape Dynamics of the Basin (Hann and others in press), Chapter 3 in the Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins (Quigley and others, in press). Additional information about potential vegetation groups is provided by Hann and others (1997).

Woodland Potential Vegetation Group

Through time, the woodland potential vegetation group would improve in integrity. Conditions related to effects of fire exclusion, overgrazing, and introduction of exotic forbs and annual grasses would be prioritized for restoration. Overgrazing by livestock has generally resulted in the loss of fine fuels that historically carried fire and in soil disturbance, both of which increase the rates at which exotics spread and woody species establish. Dominant changes that occurred between historical and current conditions were from upland herb to upland shrub, and from early-seral forest/woodland to mid-seral woodland. Succession/disturbance regimes shifted from a mix of maintenance, cycling, and acceleration to dominance by cycling and retrogression.

Over time, with improved inventory, remote sensing, and ecological modeling, there is a better understanding of the extent of woodland potential vegetation groups, and their juxtaposition in the mid- and fine-scale landscape patterns of succession/disturbance regimes. The woodland PVG physiognomic types are typically associated with site and landform conditions with a mix of maintenance and cycling succession/disturbance regimes. Areas with soils supportive of continuous fine fuels typically have fires at frequent intervals that maintain the upland herb physiognomic type, and cycle the upland shrub, early-seral forest/woodland, or open canopy mid-seral woodland.

Areas that support old, late-seral, multi-layer woodlands are typically steep north aspects with very rocky soils where fires are infrequent. In the broad-scale mapping, due to resolution error some of the dry grass, dry shrub, and cool shrub potential vegetation groups contain inclusions of this type of woodland PVG.

Areas that support old, late-seral, single-layer woodlands typically have rock outcrops or shallow soils where trees are not killed by fires in the intermingled shrub/grass areas capable of carrying fire. These trees are often fire-scarred one to three times before they die. The woodland succession/disturbance relationships on the woodland potential vegetation groups are very different from that in the dry grass, dry shrub, or cool shrub PVGs.

Through time, with the use of prescribed fire, flexible strategies on wildfire management, noncommercial tree cutting, commercial harvest, and other treatments, the mix of physiognomic types shows a trend toward the historical mix consistent with the biophysical template. Treatments are designed to restore areas that have exotics and/or eroded soils with native or desirable non-native perennial herbs that can compete with exotic weeds, provide soil protection, and represent native structures.

For areas where a fine-scale understanding of the above relationships does not exist, a conservative approach is taken relative to use of treatments that convert woodlands to herblands. Large, older trees are saved. Areas where trees exhibit fire scars are treated as underburn (nonlethal) regimes and managed for open mid- or late-seral, single-layer, physiognomic types.

Grazing systems are implemented to result in the dominance of native herbs, which have decreased under cattle and sheep grazing. Typically, these grazing systems are of short duration and low to moderate utilization, with emphasis on higher utilization levels during the dormant seasons of the plants.

Management emphasizes avoiding both the introduction and spread of exotic plants and noxious weeds, which are typically associated with overgrazing, roads, and other soil surface-disturbing activities. Consequently, these soil-disturbing types of activities are adjusted or monitored to reduce the risk of introducing or spreading exotic plants and noxious weeds. Initial introductions are aggressively controlled to avoid spread.

Seeding for wildfire rehabilitation is done only when necessary, either to protect soils or to compete with potential introductions of exotic forbs or annual grasses. If deemed necessary, seeding is done with native species if possible, non-native species that do not produce viable seed, or where necessary for restoration desirable non-native species that have similar form and adaptations as the native species that have been lost.

Dry and Moist Forest Potential Vegetation Groups

Through time, the dry and moist forest potential vegetation groups improve in integrity. Current harvest and road practices that are inconsistent with the biophysical disturbance regime and fire management practices are modified to achieve this change in trend.

In the dry forest potential vegetation groups, there have been:

- Substantial declines in late-seral (old) forest, single-layer physiognomic types.
- Substantial increases in the mid-seral forest.
- Some increases in late-seral multi-layer forest.
- Substantial declines in herb and shrub physiognomic types.
- Substantial change from forests that are shade-intolerant and resistant to insects, diseases, and fires, to forests that are shade-tolerant and susceptible to insects, diseases, and fires.

Dominant transitions from historical to current were:

- From late-seral, intolerant, single-layer forest to late-seral, tolerant, multi-layer forest.
- From late-seral, intolerant, single-layer forest to mid-seral intolerant forest.
- From mid-seral intolerant forest to late-seral tolerant multi-layer forest.

The biophysical template of the dry forest potential vegetation groups supports a succession/disturbance regime that is a mixture of acceleration, maintenance, and cycling. The current succession/disturbance regime has shifted to one dominated by cycling and retrogression. The moist forest potential vegetation group has had substantial declines in both late-seral multi-layer and single-layer types, and substantial increases in the mid-seral forest. Its biophysical template supports a succession/disturbance regime of cycling, acceleration, and maintenance. Currently, this regime is dominated by retrogression and cycling.

For areas where a fine-scale understanding of the above relationships does not exist, a conservative approach is taken relative to use of treatments that convert woodlands to herblands. Large, older trees are saved. Areas where trees exhibit fire scars are treated as underburn (nonlethal) regimes and managed for open mid- or late-seral, single-layer, physiognomic types.

Management activities addressing high risk fire/fuel conditions are prioritized to reduce these hazards where BLM- and FS-administered lands are mingled with urban and rural developments that also contain very hazardous fuel conditions. In general, management activities are designed to improve integrity and produce associated resources and values. In the rural/wildland interface, harvest and prescribed fire are used to maintain the stand structures, composition, fuels, and patch patterns in late-seral forest single-layer, open low density mid-seral forest, or early-seral physiognomic types. These classes generally have low potential for fires that crown, spread rapidly, and burn with high intensity. Fine grass fuels can be managed with grazing to reduce risk of rapid ignition and spread during the summer and early fall.

In dry and moist forests outside the rural/wildland interface zone where an emphasis is to manage for timber products, the biophysical template for underburning (nonlethal) and mixed regimes indicates that two or three fire intervals can be skipped to accumulate wood biomass for harvest.

Harvest treatments with prescribed fire emphasize production of community structure and composition similar to the biophysical template through:

- Removal of small diameter trees to allow selected trees to grow into the overstory to simulate acceleration and maintenance events.
- Removal of some overstory trees to simulate cycling events.
- Retention of a small amount of shade-intolerant overstory trees to simulate cycling events that maintain scattered large emergent trees.

In crown fire regimes, the biophysical template indicates that one or two fire intervals could be skipped to accumulate moderate diameter trees in the overstory with scattered large residual trees. Harvest treatments with prescribed fire emphasize removal of moderate diameter trees, while leaving the large residual shade-intolerant trees and selected smaller replacement shade-intolerant trees. Local fire management plans address effective strategies in areas where risk of investment or loss of property is high, and alternate strategies in areas where risks are lower.

In dry and moist forests outside the rural/wildland interface zone where the emphasis is to manage for maintenance of native patterns and processes, prescribed fire is used to represent the biophysical fire regime. Where stand structures and fuel conditions are excessively high, techniques are employed to reduce fire intensity. These techniques include using prescribed fire during cooler times of the year, pre-treating with low intensity prescribed fire, and harvesting or thinning.

Management for dominant species in dry and moist forests generally includes species that are shade intolerant and resistant to mortality from low intensity fires. Progress is made in restoring western white pine on suitable environments by regenerating with blister rust resistant stock.

Introduction and spread of exotic and noxious weeds are actively avoided. Seeding with exotic or native grasses, forbs, and shrubs for wildfire rehabilitation is avoided unless necessary. When deemed necessary, either to protect soils or to compete with potential introductions of exotic forbs or annual grasses, seeding is done with native species if possible, non-native species that do not produce viable seed, or where necessary for restoration desirable non-native species that have similar form and adaptations as the native species that have been lost.

Cold Forest

Through time, using a landscape approach, the cold forest would improve in integrity. The primary conditions that improve relate to outcomes where: fire exclusion has changed community structures and fuel conditions; there has been a loss of whitebark pine to blister rust; and harvest and road practices are inconsistent with the biophysical succession/disturbance regime.

In the cold forest potential vegetation group, there has been a substantial increase in the late-seral forest multi-layer physiognomic type and a substantial decline in the early-seral forest. The succession/disturbance regime for the biophysical template is mixed cycling, acceleration, and maintenance. Currently, the regime is dominated by retrogression, primarily related to insects and disease.

Methods are developed to use prescribed fire and harvest or thinning to represent the biophysical fire regimes. Where emphasis is managing for timber products, one or two fire intervals could be skipped to accumulate small diameter trees in the understory and to moderate closure of larger diameter overstory trees. Other management activities are designed to improve integrity and produce associated resources and values. Progress is made in restoring whitebark pine on suitable environments by providing suitable post-fire ash environments and blister rust resistant seeds or stock.

Seeding of exotic or native grasses, forbs, and shrubs for wildfire rehabilitation is avoided unless necessary. This type of seeding typically shortens the natural successional development of small native grasses and forbs. When deemed necessary, seeding is done using native species where possible, non-native species that do not produce viable seeds, or where necessary for restoration desirable non-native species that have similar form and adaptations as the native species that have been lost.

Dry Grass, Cool Shrub, and Dry Shrub Potential Vegetation Groups

Through time, using a landscape approach for management of the dry grass, cool shrub, and dry shrub potential vegetation groups would improve integrity. The primary conditions that improve relate to outcomes addressing fire exclusion, overgrazing, and introduction of exotic forbs and annual grasses. Overgrazing by livestock has generally resulted in the loss of large decreaser[1] grasses and an increase of smaller grasses, forbs, and exotic forbs and annual grasses. The combined effects of fire exclusion and excessive grazing have resulted in encroachment by woody tree species on some areas, conversion to dominance by noxious weeds and other exotics on other areas, and thickening and decadence of shrubs in remaining areas.

The dominant change that occurred in the dry grass and shrub potential vegetation groups, from historical to current conditions, was the increase in exotics. In the cool shrub potential vegetation groups, there has also been a decline in the upland herb physiognomic type. The succession/disturbance regime for the dry grass biophysical template is dominated by maintenance, while the dry shrub and cool shrub potential vegetation groups are dominated by cycling. Currently, the dry grass and shrub potential vegetation groups have either a much shorter cycle due to invasion of exotic annual grasses, or a much longer cycle due to fire exclusion and excessive grazing. The cool shrub potential vegetation group generally has shifted to a longer cycle in response to fire exclusion, grazing, and invasion of exotic perennials.

A better understanding of the extent of these types and their juxtaposition at the mid- and fine-scale and landscape patterns of succession/disturbance regimes is developed over time through improved inventory, remote sensing, and ecological modeling.

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[1]A plant whose vigor and persistence decreases with grazing use.

Through time, with the use of grazing systems, exotic weed control, prescribed fire, flexible strategies on wildfire management, and noncommercial tree encroachment, the mix of physiognomic types is maintained consistent with the biophysical template. Treatments are designed to restore areas that have exotics and eroded soils with desirable native or exotic perennial herbs that can compete with exotic weeds, provide soil protection, and represent native structures.

Implementation of grazing regimes in these systems reflects the types of grazing to which dominant decreaser native herbs are adapted. Typically, grazing regimes are of short duration and low to moderate utilization.

Both the introduction and the spread of exotic and noxious weeds in these potential vegetation groups are actively avoided. Exotic and noxious weeds are typically associated with excessive grazing, roads, and other soil surface-disturbing activities. Consequently, these types of activities are adjusted or monitored to reduce the risk of introducing exotic or noxious weeds.

Seeding with exotic and native grasses, forbs, and shrubs for wildfire rehabilitation is avoided unless necessary. This type of seeding typically shortens the successional development of small native grasses and forbs. When deemed necessary, seeding is done with native species where possible, non-native species that do not produce viable seed, or where necessary for restoration of desirable non-native species that have similar form and adaptations as the native species that have been lost.

Riparian Potential Vegetation Groups

Through time, using a landscape approach for management of the riparian potential vegetation groups improves integrity. The riparian potential vegetation groups include the riparian shrub and riparian woodland, as mapped at the broad-scale; and the riparian herb, which can only be mapped at mid- and fine-scales.

The primary conditions that improve in riparian potential vegetation groups are outcomes relating to excessive grazing by livestock, invasion by exotics, fire exclusion, and flooding disturbances. The assessment documented changes in dominance of perennial exotic grasses, forbs, shrubs, and trees in all riparian types.

A better understanding of the extent of the riparian potential vegetation groups, their physiognomic types and juxtaposition at the mid- and fine-scales, and the associated landscape patterns of succession/disturbance regimes is developed over time through improved inventory, remote sensing, and ecological modeling.

Through time, with the use of improved livestock grazing practices, a watershed approach to design of roads and vegetation management, road restoration in flood plains, prescribed fire, flexible strategies on wildfire management, reintroduction of beavers, and other riparian/upland management strategies, the mix of physiognomic types trends toward the mix consistent with the biophysical template. Restoration treatments focus on areas with roads, exotics, compacted and eroded soils, and degraded stream channels, within a watershed context.

Grazing regimes implemented in these systems reflect the types of grazing to which the dominant decreaser native trees, shrubs, and herbs are adapted. Typically, the grazing regimes used are of short duration and low utilization.

Both the introduction and spread of exotic species of trees, shrubs, and herbs, and noxious weeds in the riparian potential vegetation groups are actively contained or controlled. Because exotics and noxious weeds are typically associated with excessive grazing, roads, and other soil surface-disturbing activities, these types of activities would be adjusted or monitored to reduce the risk of introducing exotic plants or noxious weeds.

Seeding with exotic or native grasses, forbs, shrubs, or trees for wildfire rehabilitation is avoided unless necessary as this type of seeding typically shortens the natural successional development of native early-seral communities. When deemed necessary, seeding is done with native species when possible, non-natives that do not produce seed, or where necessary for restoration desirable non-native species that have similar form and adaptations as the native species that have been lost.

Alpine Potential Vegetation Group

The alpine potential vegetation group has generally not been identified as having widespread dysfunctional conditions in composition, structure, or succession/disturbance regimes. Localized problems from abandoned mines, roads, and historic grazing disturbance are restored through time.

Appendix 2-B

Table 2-B.1. Prescription model characteristics for forest land Alternative 1, Eastside EIS area.

	BLM/FS Forested Areas				
	Wilderness-like	Other			
Prescription (Rx)	N6	N5	N6	N7	N8
Percent of Area	24	8	1	12	56
Hectares (1,000)	1423.8	442.2	48.9	718.6	3292.2
Harvest (area treated)	N	M	N	M	H
Thin (area treated)	N	M	N	M	H
Prescribed Fire	L	L	L	L	H
Wildfire Hazard	M	M	M	M	M
Road Reductions	N/A	L	L	L	L
Aquatic/Riparian Emphasis	C	P	P/C	P/C	P
Commodity Emphasis	N	H	N	H	H
Wildfire Suppression	H	H	H	H	H
Large Snag Conservation	H	M	H	L	N
Large Down Wood Conservation	H	M	H	L	N
Duff/Litter Cover	H	M	H	M	L
Prescription Type	T	T	T	T	T
Allocation Method	P	A	P	A	A

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = None
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.2. Prescription model characteristics for forest land Alternative 2, Eastside EIS area.

	BLM/FS Forested Areas				
	Wilderness-like	Other			
Prescription (Rx)	N6	N4	N5	N6	N7
Percent of Area	24	12	45	7	12
Hectares (1,000)	1423.8	732.6	2640	435.6	693.7
Harvest (area treated)	N	L	M	N	M
Thin (area treated)	N	L	M	N	M
Prescribed Fire	L	L	L	L	L
Wildfire Hazard	M	M	M	M	M
Road Reductions	N/A	L	L	L	M
Aquatic/Riparian Emphasis	R/P	C	P/C	C	P/C
Commodity Emphasis	N/A	M	M	N	M
Wildfire Suppression	H	H	H	H	H
Large Snag Conservation	H	M	M	H	L
Large Down Wood Conservation	H	M	M	H	L
Duff/Litter Cover	H	M	M	H	M
Prescription Type	T	T	T	T	T
Allocation Method	P	A	A	P	A

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.3. Prescription model characteristics for forest land Alternative 3, Eastside EIS area.

	BLM/FS Forested Areas				
	Wilderness-like	Other			
Prescription (Rx)	A1	A1	A2	A3	N2
Percent of Area	24	1	64	7	3
Hectares (1,000)	1394.3	65.8	3816.3	392.3	196.3
Harvest (area treated)	N	N	M	H	M
Thin (area treated)	N	N	H	H	M
Prescribed Fire	H	H	H	H	L
Wildfire Hazard	L	L	L	L	M
Road Reductions	N/A	L	L	L	L
Aquatic/Riparian Emphasis	C	C/R	R	R/P	C/R
Commodity Emphasis	N/A	M	M	MU	M
Wildfire Suppression	L	M	M	H	H
Large Snag Conservation	H	H	H	M	L
Large Down Wood Conservation	H	H	H	M	L
Duff/Litter Cover	H	H	H	H	M
Prescription Type	E	E	E	E	E
Allocation Method	M	M	M	M	A

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.4. Prescription model characteristics for forest land Alternative 4, Eastside EIS area.

	BLM/FS Forested Areas			
	Wilderness-like	Other		
Prescription (Rx)	A1	A1	A2	N2
Percent of Area	24	1	71	3
Hectares (1,000)	1394.3	50.7	4223.7	196.3
Harvest (area treated)	N	N	M	M
Thin (area treated)	N	N	H	M
Prescribed Fire	H	H	H	L
Wildfire Hazard	L	L	L	M
Road Reductions	N/A	N/A	L	L
Aquatic/Riparian Emphasis	C	R	R	R
Commodity Emphasis	N/A	N/A	M	M
Wildfire Suppression	L	L	M	H
Large Snag Conservation	H	H	H	L
Large Down Wood Conservation	H	H	H	L
Duff/Litter Cover	H	H	H	M
Prescription Type	E	E	E	E
Allocation Method	M	M	M	A

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.5. Prescription model characteristics for forest land Alternative 5, Eastside EIS area.

	BLM/FS Forested Areas						
	Wilderness-like		Other				
Prescription (Rx)	A1	N1	A1	A2	A3	N2	N5
Percent of Area	21	3	2	54	11	7	2
Hectares (1,000)	1244.6	179.2	97.3	3178.4	635.2	440.8	95.8
Harvest (area treated)	N	N	N	M	H	M	M
Thin (area treated)	N	N	N	H	H	M	M
Prescribed Fire	H	L	H	H	H	L	L
Wildfire Hazard	L	M	L	L	L	M	M
Road Reduction	N/A	N/A	L	L	L	L	L
Aquatic/Riparian Emphasis	C	C	R	R	P	R/P	R/P
Commodity Emphasis	N/A	N/A	L	M	M	M	M
Wildfire Suppression	L	L	H	M	H	H	H
Large Snag Conservation	H	H	H	H	M	L	M
Large Down Wood Conservation	H	H	H	H	M	L	M
Duff/Litter Cover	H	H	H	H	H	M	M
Prescription Type	E	E	E	E	E	E	E
Allocation Method	M	M	M	M	M	A	A

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.6. Prescription model characteristics for forest land Alternative 6, Eastside EIS area.

	BLM/FS Forested Areas					
	Wilderness-like		Other			
Prescription	A1	N1	A1	A2	N1	N5
Percent of Area	20	4	4	66	2	3
Hectares (1,000)	1186.1	237.7	250.5	3903.6	105.6	196.3
Harvest (area treated)	N	N	N	M	N	M
Thin (area treated)	N	N	N	H	N	M
Prescribed Fire	H	L	H	H	L	L
Wildfire Hazard	L	M	L	L	M	M
Road Reductions	N/A	N/A	L	L	L	L
Aquatic/Riparian Emphasis	C	C	R	R	R/C	R/C
Commodity Emphasis	N/A	N/A	L	M	M	M
Wildfire Suppression	L	L	L	M	H	H
Large Snag Conservation	H	H	H	H	H	M
Large Down Wood Conservation	H	H	H	H	H	M
Duff/Litter Cover	H	H	H	H	H	M
Prescription Type	E	E	E	E	E	E
Allocation Method	M	M	M	M	M	A

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = Prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.7. Prescription model characteristics for forest land Alternative 7, Eastside EIS area.

	BLM/FS Forested Areas							
	Wilderness-like		Other					
Prescription (Rx)	A1	N1	P1	A2	A3	N1	N4	P1
Percent of Area	5	4	15	30	3	5	22	14
Hectares (1,000)	308.5	218.7	896.6	1747.9	172.2	313.4	1324	836
Harvest (area treated)	N	N	N	M	H	N	L	N
Thin (area treated)	N	N	N	H	H	N	L	N
Prescribed Fire	H	L	N	H	H	L	L	N
Wildfire Hazard	L	M	H	L	L	M	M	H
Road Reductions	N/A	N/A	N/A	L	L	L	L	N/A
Aquatic/Riparian Emphasis	C	C	C	C/R	C/R	C/R	C/R	C/R
Commodity Emphasis	N/A	N/A	N/A	M	M	M	M	N/A
Wildfire Suppression	L	L	L	M	H	H	H	L
Large Snag Conservation	H	H	L	H	M	H	M	L
Large Down Wood Conservation	H	H	L	H	M	H	M	L
Duff/Litter Cover	H	H	L	H	H	H	M	L
Prescription Type	E	E	T	E	E	E	E	T
Allocation Method	M	M	P	M	M	M	A	P

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.8. Prescription model characteristics for rangeland Alternative 1, Eastside EIS area.

	BLM/FS Rangeland Areas		
	Wilderness-like	Other	
Prescription (Rx)	C1	N2	N3
Percent of Area	24	72	4
Hectares (1,000)	1376.7	4228.3	221.2
Grazing Effects	L	M	M
Upland Treatments	N	L	L
Riparian Treatments	N	L	L
Woodland Treatments	N	M	M
Prescribed Fire	L	L	L
Noxious Weed Management	L	L	L
Wildfire Hazard	M	M	H
Aquatic/Riparian Emphasis	C	P	P
Commodities	N	H	H
Wildfire Suppression	H	H	H
Prescription Types	T	T	T
Allocation Method	P	A	A

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.9. Prescription model characteristics for rangeland Alternative 2, Eastside EIS area.

	BLM/FS Rangeland Areas		
	Wilderness-like	Other	
Prescription (Rx)	N1	N1	N5
Percent of Area	24	1	74
Hectares (1,000)	1376.7	34.6	4316.2
Grazing Effects	L	L	L
Upland Treatments	L	L	L
Riparian Treatments	L	L	L
Woodland Treatments	N	N	M
Prescribed Fire	L	L	L
Noxious Weed Management	L	L	L
Wildfire Hazard	M	M	M
Aquatic/Riparian Emphasis	C	P/C	P/C
Commodities	N	L	L
Wildfire Suppression	M	M	M
Prescription Types	T	T	T
Allocation Method	M	M	A

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.10. Prescription model characteristics for rangeland Alternative 3, Eastside EIS area.

	BLM/FS Rangeland Areas		
	Wilderness-like	Other	
Prescription (Rx)	N1	A2	A3
Percent of Area	24	16	60
Hectares (1,000)	1376.7	915.6	3531.4
Grazing Effects	L	L	L
Upland Treatments	L	H	M
Riparian Treatments	L	H	M
Woodland Treatments	N	H	H
Prescribed Fire	L	H	M
Noxious Weed Management	L	H	M
Wildfire Hazard	M	L	L
Aquatic/Riparian Emphasis	C	C/R	R/P
Commodities	N	M	M
Wildfire Suppression	H	H	H
Prescription Type	E	E	E
Allocation Method	M	M	M

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.11. Prescription model characteristics for rangeland Alternative 4, Eastside EIS area.

	BLM/FS Rangeland Areas	
	Wilderness-like	Other
Prescription (Rx)	N1	A2
Percent of Area	24	76
Hectares (1,000)	1376.7	4465.5
Grazing Effects	L	L
Upland Treatments	L	H
Riparian Treatments	L	H
Woodland Treatments	N	H
Prescribed Fire	L	H
Noxious Weed Management	L	H
Wildfire Hazard	M	L
Aquatic/Riparian Emphasis	C	R
Commodities	N	M
Wildfire Suppression	H	H
Prescription Type	E	E
Allocation Method	M	M

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional: E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.12. Prescription model characteristics for rangeland Alternative 5, Eastside EIS area.

	BLM/FS Rangeland Areas			
	Wilderness-like	Other		
Prescription	N1	A2	A3	N2
Percent of Area	24	3	60	13
Hectares (1,000)	1376.7	194.9	3476.3	776.1
Grazing Effects	L	L	L	M
Upland Treatments	L	H	M	L
Riparian Treatments	L	H	M	L
Woodland Treatments	N	H	H	M
Prescribed Fire	L	H	M	L
Noxious Weed Management	L	H	M	L
Wildfire Hazard	M	L	L	M
Aquatic/Riparian Emphasis	C	R/P	R/P	P
Commodities	N	M	M	H
Wildfire Suppression	H	H	H	H
Prescription Type	E	E	E	E
Allocation Method	M	M	M	A

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.13. Prescription model characteristics for rangeland Alternative 6, Eastside EIS area.

	BLM/FS Rangeland Areas				
	Wilderness-like	Other			
Prescription	N1	A2	A3	N1	N4
Percent of Area	24	61	3	2	11
Hectares (1,000)	1376.7	3546.3	154.7	141.5	623.6
Grazing Effects	L	L	L	L	L
Upland Treatments	L	H	M	L	L
Riparian Treatments	L	H	M	L	L
Woodland Treatments	N	H	H	N	M
Prescribed Fire	L	H	M	L	L
Noxious Weed Management	L	H	M	L	L
Wildfire Hazard	M	L	L	M	M
Aquatic/Riparian Emphasis	C	R	C/R	C	C
Commodities	N	M	M	L	L
Wildfire Suppression	H	H	H	H	H
Prescription Type	E	E	E	E	E
Allocation Method	M	M	M	M	A

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional: E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.14. Prescription model characteristics for rangeland, Alternative 7, Eastside EIS area.

	BLM/FS Rangeland Areas						
	Wilderness-like		Other				
Prescription	N1	P1	A2	N1	N4	N5	P1
Percent of Area	14	9	43	9	11	10	3
Hectares (1,000)	829.3	547.4	2513.9	512.7	653.2	605.1	181.2
Grazing Effects	L	L	L	L	L	L	L
Upland Treatments	L	N	H	L	L	L	N
Riparian Treatments	L	N	H	L	L	L	N
Woodland Treatments	N	N	H	N	M	M	N
Prescribed Fire	L	N	H	L	L	L	N
Noxious Weed Management	L	L	H	L	L	L	L
Wildfire Hazard	M	H	L	M	M	M	H
Aquatic/Riparian Emphasis	C	C	C/R	C	C	C	C
Commodities	N	N	M	L	L	L	N
Wildfire Suppression	L	L	H	H	H	H	L
Prescription Type	E	T	E	E	E	E	T
Allocation Method	M	P	M	M	A	A	P

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.15. Prescription model characteristics for forest land Alternative 1, Upper Columbia River Basin EIS area

	BLM/FS Forested Areas				
	Wilderness-like	Other			
Prescription	N6	N4	N5	N6	N8
Percent of Area	28	22	5	4	41
Hectares (1,000)	2861.5	2258.1	551.2	374.4	4180.1
Harvest (area treated)	N	L	M	N	H
Thin (area treated)	N	L	M	N	H
Prescribed Fire	L	L	L	L	L
Wildfire Hazard	M	M	M	M	M
Road Reductions	N/A	L	L	L	L
Aquatic/Riparian Emphasis	C	P	P	C/P	P
Commodity Emphasis	N/A	M	H	L	H
Wildfire Suppression	H	H	H	H	H
Large Snag Conservation	H	M	M	H	N
Large Down Wood Conservation	H	M	M	H	N
Duff/Litter Cover	H	M	M	H	M
Prescription Type	T	T	T	T	T
Allocation Method	P	A	A	P	A

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.16. Prescription model characteristics for forest land Alternative 2, Upper Columbia River Basin EIS area.

	BLM/FS Forested Areas		
	Wilderness-like	Other	
Prescription (Rx)	N6	N4	N6
Percent of Area	28	49	24
Hectares (1,000)	2861.5	4960.2	2403.6
Harvest (area treated)	N	L	N
Thin (area treated)	N	L	N
Prescribed Fire	L	L	L
Wildfire Hazard	M	M	M
Road Reductions	N/A	L	L
Aquatic/Riparian Emphasis	C	P/C	C
Commodity Emphasis	N/A	M	L
Wildfire Suppression	H	H	H
Large Snag Conservation	H	M	H
Large Down Wood Conservation	H	M	H
Duff/Litter Cover	H	M	H
Prescription Type	T	T	T
Allocation Method	P	A	P

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.17. Prescription model characteristics for forest land Alternative 3, Upper Columbia River Basin EIS area.

	BLM/FS Forested Areas					
	Wilderness-like	Other				
Prescription (Rx)	A1	A1	A2	A3	N2	N5
Percent of Area	28	7	43	21	1	1
Hectares (1,000)	2811.7	702.2	4375.9	2114.1	84.7	61.9
Harvest (area treated)	N	N	M	H	M	M
Thin (area treated)	N	N	H	H	M	M
Prescribed Fire	H	H	H	H	L	L
Wildfire Hazard	L	L	L	L	M	M
Road Reductions	N/A	L	L	L	L	L
Aquatic/Riparian Emphasis	C	C/R	R	R/P	R/P	R/P
Commodity Emphasis	N/A	M	M	M	M	M
Wildfire Suppression	H	H	H	H	H	H
Large Snag Conservation	H	H	H	M	L	M
Large Down Wood Conservation	H	H	H	M	L	M
Duff/Litter Cover	H	H	H	H	M	M
Prescription Type	E	E	E	E	E	E
Allocation Method	M	M	M	M	A	A

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.18. Prescription model characteristics for forest land Alternative 4, Upper Columbia River Basin EIS area.

	BLM/FS Forested Areas				
	Wilderness-like	Other			
Prescription (Rx)	A1	A1	A2	N2	N5
Percent of Area	28	4	66	1	1
Hectares (1,000)	2811.7	449.5	6742.7	84.7	61.9
Harvest (area treated)	N	N	M	M	M
Thin (area treated)	N	N	H	M	M
Prescribed Fire	H	H	H	L	L
Wildfire Hazard	L	L	L	M	M
Road Reductions	N/A	L	L	L	L
Aquatic/Riparian Emphasis	C	C/R	R	C/R	C/R
Commodity Emphasis	N/A	L	M	M	M
Wildfire Suppression	H	H	H	H	H
Large Snag Conservation	H	H	H	L	M
Large Down Wood Conservation	H	H	H	L	M
Duff/Litter Cover	H	H	H	M	M
Treatment Type	E	E	E	E	E
Allocation Method	M	M	M	A	A

Hectare = 2.47 acres
L = low; M = moderate; H = high: N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T= traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.19. Prescription model characteristics for forest land Alternative 5, Upper Columbia River Basin EIS area.

	BLM/FS Forested Areas							
	Wilderness-like		Other					
Prescription (Rx)	A1	N1	A1	A2	A3	N1	N2	N5
Percent of Area	17	11	8	26	24	5	4	5
Hectares (1,000)	1783.4	1078.1	780.7	2692.2	2459.7	513.2	407.3	485.7
Harvest (area treated)	N	N	N	M	H	N	M	M
Thin (area treated)	N	N	N	H	H	N	M	M
Prescribed Fire	H	L	H	H	H	L	L	L
Wildfire Hazard	L	M	L	L	L	M	M	M
Road Reductions	N/A	N/A	N/A	L	L	L	L	L
Aquatic/Riparian Emphasis	C	C	C/R	C/R	R/P	R/C	R/P	R/P
Commodity Emphasis	N/A	N/A	M	M	M	M	M	M
Wildfire Suppression	H	H	H	H	H	H	H	H
Large Snag Conservation	H	H	H	H	M	H	L	M
Large Down Wood Conservation	H	H	H	H	M	H	L	M
Duff/Litter Cover	H	H	H	H	H	H	M	M
Prescription Type	E	E	E	E	E	E	E	E
Allocation Method	M	M	M	M	M	M	A	A

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.20. Prescription model characteristics for forest land Alternative 6, Upper Columbia River Basin EIS area

	BLM/FS Forested Areas					
	Wilderness-like		Other			
Prescription (Rx)	A1	N1	A1	A2	N1	N4
Percent of Area	17	11	13	49	6	3
Hectares (1,000)	1722	1139.5	1360.5	5039.4	567.5	311.7
Harvest (area treated)	N	N	N	M	N	L
Thin (area treated)	N	N	N	H	N	L
Prescribed Fire	H	L	H	H	L	L
Wildfire Hazard	L	M	L	L	M	M
Road Reductions	N/A	N/A	L	L	L	L
Aquatic/Riparian Emphasis	C	C	C/R	R	R	R
Commodity Emphasis	N/A	N/A	M	M	M	M
Wildfire Suppression	H	H	H	H	H	H
Large Snag Conservation	H	H	H	H	H	M
Large Down Wood Conservation	H	H	H	H	H	M
Duff/Litter Cover	H	H	H	H	H	M
Prescription Type	E	E	E	E	E	E
Allocation Method	M	M	M	M	M	A

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.21. Prescription model characteristics for forest land Alternative 7, Upper Columbia River Basin EIS area.

	BLM/FS Forested Areas							
	Wilderness-like		Other					
Prescription (Rx)	A1	N1	P1	A1	A2	N1	N4	P1
Percent of Area	3	4	21	4	22	16	20	9
Hectares (1,000)	317.8	354.9	2188.8	445.3	2217.4	1637.8	2080.7	891.7
Harvest (area treated)	N	N	N	N	M	N	L	N
Thin (area treated)	N	N	N	N	H	N	L	N
Prescribed Fire	H	L	N	H	H	L	L	N
Wildfire Hazard	L	M	H	L	L	M	M	H
Road Reductions	N/A	N/A	N/A	L	L	L	L	N/A
Aquatic/Riparian Emphasis	C	C	C	C/R	C/R	C/R	C/R	C/R
Commodity Emphasis	N/A	N/A	N/A	M	M	M	M	N/A
Wildfire Suppression	L	L	L	M	M	H	H	L
Large Snag Conservation	H	H	L	H	H	H	M	L
Large Down Wood Conservation	H	H	L	H	H	H	M	L
Duff/Litter Cover	H	H	L	H	H	H	M	L
Prescription Type	E	E	T	E	E	E	E	T
Allocation Method	M	M	P	M	M	M	A	P

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.22. Prescription model characteristics for rangeland Alternative 1, Upper Columbia River Basin EIS area.

	BLM/FS Rangeland Areas		
	Wilderness-like	Other	
Prescription (Rx)	C1	N2	N3
Percent of Area	15	75	10
Hectares (1,000)	1017.8	5081.7	646.7
Grazing Effects	L	M	M
Upland Treatments	N	L	L
Riparian Treatments	N	L	L
Woodland Treatments	N	M	M
Prescribed Fire	L	L	L
Noxious Weed Management	L	L	L
Wildfire Hazard	M	M	H
Aquatic/Riparian Emphasis	C	P	P
Commodities	N	H	H
Wildfire Suppression	H	H	H
Prescription Type	T	T	T
Allocation Method	P	A	A

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.23. Prescription model characteristics for rangeland Alternative 2, Upper Columbia River Basin EIS area.

	BLM/FS Rangeland Areas			
	Wilderness-like	Other		
Prescription (Rx)	N1	N1	N4	N5
Percent of Area	15	1	10	74
Hectares (1,000)	1017.8	63.2	663.9	5008.5
Grazing Effects	L	L	L	L
Upland Treatments	L	L	L	L
Riparian Treatments	L	L	L	L
Woodland Treatments	N	N	M	M
Prescribed Fire	L	L	L	L
Noxious Weed Management	L	L	L	L
Wildfire Hazard	M	M	M	M
Aquatic/Riparian Emphasis	C	P/C	P/C	P/C
Commodities	N	L	L	L
Wildfire Suppression	M	M	H	M
Prescription Type	T	T	T	T
Allocation Method	M	M	A	A

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.24. Prescription model characteristics for rangeland Alternative 3, Upper Columbia River Basin EIS area.

	BLM/FS Rangeland Areas		
	Wilderness-like	Other	
Prescription	N1	A2	A3
Percent of Area	15	55	30
Hectares (1,000)	1017.8	3683.2	2023.1
Grazing Effects	L	L	L
Upland Treatments	L	H	M
Riparian Treatments	L	H	M
Woodland Treatments	N	H	H
Prescribed Fire	L	H	M
Noxious Weed Management	L	H	M
Wildfire Hazard	M	L	L
Aquatic/Riparian Emphasis	C	C/R	R/P
Commodities	N	M	M
Wildfire Suppression	H	H	H
Prescription Type	E	E	E
Allocation Method	M	M	M

Hectare = 2.47 acres
L = low; M = moderate; H = high: N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.25. Prescription model characteristics for rangeland Alternative 4, Upper Columbia River Basin EIS area.

	BLM/FS Rangeland Areas	
	Wilderness-like	Other
Prescription (Rx)	N1	A2
Percent of Area	15	85
Hectares (1,000)	1017.8	5713.1
Grazing Effects	L	L
Upland Treatments	L	H
Riparian Treatments	L	H
Woodland Treatments	N	H
Prescribed Fire	L	H
Noxious Weed Management	L	H
Wildfire Hazard	M	L
Aquatic/Riparian Emphasis	C	R
Commodities	N	M
Wildfire Suppression	H	H
Prescription Type	E	E
Allocation Method	M	M

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.26. Prescription model characteristics for rangeland Alternative 5, Upper Columbia River Basin EIS area.

	BLM/FS Rangeland Areas			
	Wilderness-like	Other		
Prescription (Rx)	N1	A2	A3	N2
Percent of Area	15	4	30	51
Hectares (1,000)	1017.8	298.8	2018.8	3410.8
Grazing Effects	L	L	L	M
Upland Treatments	L	H	M	L
Riparian Treatments	L	H	M	L
Woodland Treatments	N	H	H	M
Prescribed Fire	L	H	M	L
Noxious Weed Management	L	H	M	L
Wildfire Hazard	M	L	L	M
Aquatic/Riparian Emphasis	C	R/P	R/P	P
Commodities	N	M	M	H
Wildfire Suppression	H	H	H	H
Prescription Type	E	E	E	E
Allocation Method	M	M	M	A

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.27. Prescription model characteristics for rangeland Alternative 6, Upper Columbia River Basin EIS area.

	BLM/FS Rangeland Areas				
	Wilderness-like	Other			
Prescription (Rx)	N1	A2	A3	N1	N4
Prescription of Area	15	30	5	13	37
Hectares (1,000)	1017.8	2045.2	320.4	903	2467
Grazing Effects	L	L	L	L	L
Upland Treatments	L	H	M	L	L
Riparian Treatments	L	H	M	L	L
Woodland Treatments	N	H	H	N	M
Prescribed Fire	L	H	M	L	L
Noxious Weed Management	L	H	M	L	L
Wildfire Hazard	M	L	L	M	M
Aquatic/Riparian Emphasis	C	R	C/R	C	C
Commodities	N	M	M	L	L
Wildfire Suppression	H	H	H	H	H
Prescription Type	E	E	E	E	E
Allocation Method	M	M	M	M	A

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Table 2-B.28. Prescription model characteristics for rangeland Alternative 7, Upper Columbia River Basin EIS area.

	BLM/FS Rangeland Areas						
	Wilderness-like		Other				
Prescription (Rx)	N1	P1	A2	N1	N4	N5	P1
Percent of Area	5	11	15	34	10	17	8
Hectares (1,000)	304.3	713.5	1015	2313.9	680.7	1170.8	553.5
Grazing Effects	L	L	L	L	L	L	L
Upland Treatments	L	N	H	L	L	L	N
Riparian Treatments	L	N	H	L	L	L	N
Woodland Treatments	N	N	H	N	M	M	N
Prescribed Fire	L	N	H	L	L	L	N
Noxious Weed Management	L	L	H	L	L	L	L
Wildfire Hazard	M	H	L	M	M	M	H
Aquatic/Riparian Emphasis	C	C	C/R	C	C	C	C
Commodities	N	N	M	L	L	L	N
Wildfire Suppression	L	L	H	H	H	H	L
Prescription Type	E	T	E	E	E	E	E
Allocation Method	M	P	M	M	A	A	P

Hectare = 2.47 acres
L = low; M = moderate; H = high; N = none
Emphasis: C = conserve; R = restore; P = produce
Prescription: T = traditional; E = ecological
Allocation: P = prescription; A = area; M = multi-scale
N/A = not applicable

Appendix 2-C

Management Emphasis[1] Categories

A. Ecosystem Management Emphasis Categories

Conservation (C) — "planned management to prevent exploitation, destruction, or neglect."

A conservation emphasis assumes that the area of assessment has a dominant landscape component that is functioning relatively well as a native or naturalized system and is producing associated human needs and values within the capabilities of the system. These landscapes generally have moderate to high ecological integrity and socioeconomic resiliency. Integrity is based on the wholeness of elements and relationships of the primary ecological systems (geologic, geomorphic, climatic, hydrologic, carbon-nutrient, food web, evolutionary, and toxins). There may be inclusions (less than 20% of the area) with other emphases.

*The geologic, geomorphic, pedogenic, climatic, hydrologic, and carbon-nutrient systems are functioning similar to the native (HRV) system, and are shifting in a resilient manner to current and potential future climate change and geologic events. Resilient change in response to climate change or geologic events would mean shifts in land forms (geomorphic), soil development (pedogenic), water flow or transpiration (hydrologic), and vegetation types (carbon-nutrient) that are in sync with the changes in climate and the geologic events (for example, erosion rates would not be excessive or forest soils would not be developing on grassland soils as climates changed to warmer conditions).

*Terrestrial and aquatic systems (species and habitats) have a relatively complete array of native diversity. This does not mean that the composition is equivalent to native (HRV). However, the opportunity to manage for systems somewhat similar to native (HRV) should be available.

A conservation emphasis assumes that relatively low management activity energy is needed for active restoration of terrestrial, aquatic, hydrologic, carbon-nutrient and pedogenic systems because their current and future trends are relatively stable in response to disturbance and human effects.

A conservation emphasis assumes that human values and needs will flow from management systems that are designed to simulate the changes and disturbances that would occur within or relatively close to native (HRV) patterns.

A conservation emphasis assumes that a coarse-filter strategy of managing landscape patterns of succession/disturbance regimes similar to HRV will conserve and recover most native species diversity. Stronghold or relic populations of threatened, endangered, candidate, or sensitive species may need short-term protection from disturbance of habitat that would occur in an HRV regime in order to expand the population to adjacent habitats.

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[1]The strategy of conserve, restore and produce as a basis for ecosystem management was developed by Jeff Blackwood and other Project staff, based on the concepts in "Forest Service Ethics and Course to the Future" by Jack Ward Thomas, and coordinated with BLM leadership.

Restoration (R) — "to bring back to a former or original condition, pattern, or process."

A restoration emphasis assumes that the area of assessment has a dominant landscape component that is not functioning well as a native, naturalized, or non-native system and/or in the production of human needs and values within the capability of the system. Ecological integrity is usually low and socioeconomic resiliency is low or at risk. There may be inclusions (less than 20% of the area) of other emphases.

*The geologic, geomorphic, pedogenic, climatic, hydrologic, and carbon-nutrient systems are not functioning similar to the native (HRV) system, and are not resilient to current and potential future disturbance, climate change and geologic events.

*Terrestrial and aquatic systems (species and habitats) are not functioning like native systems. Generally the composition and structure will be well outside of native (HRV). There may be permanent alteration to biophysical potentials.

A restoration emphasis assumes that moderate management activity energy is needed for active restoration of terrestrial, aquatic, hydrologic, carbon-nutrient, and/or pedogenic systems because their current and future trends are unstable in response to disturbance and human effects. Productivity may be at risk as well as increased risk of erratic disturbance events.

A restoration emphasis assumes that human values and needs will not flow from managed systems unless there is active restoration to shift composition, structure, and disturbance to a system that would be more consistent with native (HRV) patterns. It is likely that altered biophysical systems cannot be managed for consistency with native (HRV) patterns because cause-and effect responses have changed. These systems will require a different type of management to provide for resiliency and predictable response to disturbance, while conserving productivity and native diversity. Some processes and functions may be similar to native (HRV), while others may be different in order to account for the altered causes and effects.

A restoration emphasis assumes that a coarse-filter strategy of managing landscape patterns of succession/disturbance regimes similar to native (HRV) will not conserve and recover native species diversity. Active restoration of "lost" functions and species may recover the landscapes to a functioning condition that can then be managed with a conservation or production strategy. Stronghold or relic populations of threatened, endangered, candidate, or sensitive species will need protection from disturbance of habitat that would occur in or outside the native (HRV) regime in order to expand the population to adjacent habitats.

Production (P) — "output of a commodity, value, or need."

A production emphasis assumes that the area of assessment has a dominant landscape component that is functioning relatively well as a native, naturalized or non-native system in association with production of human needs, commodities, and values. Ecological integrity is usually moderate to high, as is socioeconomic resiliency. In some cases ecological integrity may be low and substantial mitigation is needed in order maintain biophysical potentials and avoid catastrophic disturbance. There may be inclusions (less than 20% of the area) of other emphases.

*The geologic, geomorphic, pedogenic, climatic, hydrologic, and carbon-nutrient systems may or may not be functioning similar to the native (HRV) system. However these systems are shifting in a resilient manner to current and potential future climate change and geologic events.

Resilient change in response to climate change or geologic events would mean shifts in land forms (geomorphic), soil development (pedogenic), water flow or transpiration (hydrologic), and vegetation types (carbon-nutrient) that are in sync with the changes in climate and the geologic events (for example, erosion rates would not be excessive or forest soils would not be developing on grassland soils as climates changed to warmer conditions) such that they would not affect the capacity to produce human commodities, values, and needs.

*Terrestrial and aquatic systems (species and habitats) may or may not function like native systems. Generally the composition and structure will be well outside of HRV and there may be permanent alteration to biophysical potentials. However the departure from native (HRV) and alteration of biophysical potentials does not affect the capacity to sustain human commodities, values, and needs. The risks to productivity, current native diversity, and human values and needs caused by departure from native (HRV) system processes are relatively low in these systems, or high risks can be mitigated with increased management activity.

A production emphasis assumes that relatively high management activity is needed for active production of human commodities, values, and needs, while conserving the productive capacity and current native diversity of the terrestrial, aquatic, hydrologic, carbon-nutrient, and/or pedogenic systems.

A production emphasis assumes that human commodities, values, and needs, will flow from management systems with mitigation to conserve current native composition, structure, and disturbance. The systems may not be consistent with native (HRV) patterns but they are managed consistently with biophysical potentials, not against internal system disturbance trends. This will enhance the ability of the system to achieve multiple emphases of production, conservation, and restoration. It is likely that altered biophysical systems cannot be managed for consistency with native (HRV) because cause-and-effect responses have changed. These systems will require a different type of management to conserve productivity and provide for resiliency and predictable response to disturbance. Active mitigation will be needed to conserve current native diversity. Some processes and functions may be similar to native (HRV), while others may be different in order to account for altered causes and effects. Some systems may need to be artificially supported to maintain or enhance production emphasis.

A production emphasis assumes that a coarse-filter strategy of managing landscape patterns of succession/disturbance regimes similar to native (HRV) or with mitigation will conserve the current native species diversity. Active restoration of "lost" functions and species may occur in association with some production activities to recover landscapes to a more native functioning condition that will more efficiently achieve production objectives. Stronghold or relic populations of threatened, endangered, candidate, or sensitive species will need protection from disturbance of habitat or migration corridors that would occur in order to expand the population to adjacent habitats.

Restoration/Conservation (RC) — dominant component of the area is a landscape strategy for restoration and conversion to conservation. The objective is to rapidly restore the area because of its adjacency to an area with a conservation strategy, that has an objective for expansion.

Restoration/Production (RP) — dominant component of the area is in a landscape strategy for restoration, while producing at reduced levels. This strategy is designed to restore the area in order to achieve a long-term strategy of sustainable production.

Conservation/Production (CP) — dominant component of the area is a landscape strategy for conservation, but with considerable opportunities for production of human commodities and values while maintaining ecological processes. This strategy is designed to conserve the area while producing sustainable commodities and values.

Mixed (MM) — the various conservation, restoration, and production strategies are mixed within the assessment area to achieve proper functioning systems with multiple ecosystem management objectives for conservation, restoration, and production. This strategy is common for larger landscapes, subregions, and regions.

B. Traditional Management Emphasis Categories

Traditional Commodity (TC) — "output of a commodity, value, or need."

A traditional commodity emphasis assumes that the area of assessment has a dominant landscape component that is managed for traditional production of human needs, commodities, and values. Emphasis is on the multiple, but relatively independent management of various resources (fire protection, timber, forage, recreation, wildlife, fisheries, and water) for sustained yield of the resource.

*The geologic, geomorphic, pedogenic, climatic, hydrologic, and carbon-nutrient systems are typically not functioning similar to the native (HRV) system. These systems are typically not responding in a resilient manner to current and potential future climate change and geologic events.

*Terrestrial and aquatic systems (species and habitats) generally are not functioning as native systems. Generally the composition and structure will be well outside of HRV and there may be high risk or actual permanent alteration to biophysical potentials. The departure from HRV and alteration of biophysical potentials often result in reduced production or risk to production of human commodities, values, and needs. Attempts to mitigate for loss of system capabilities, reduced native diversity, and increasing risk of species extinctions typically are unsuccessful or require very high investments of management activities.

A traditional commodity emphasis assumes that relatively high management activity energy is needed for active production of human commodities, values, and needs with substantial emphasis on protection to conserve current native diversity of the terrestrial, aquatic, hydrologic, carbon-nutrient, and/or pedogenic systems. Energy invested in commodities and protection of systems is often precluded by disturbance events.

A traditional commodity emphasis assumes that human commodities, values and needs will flow from management systems that are often in conflict with ecological relationships and landscape limitations. Mitigation is typically used to conserve current native composition, structure, and disturbance, but these efforts are often unsuccessful because of conflicts with ecological relationships and landscape limitations. Most systems will need to be artificially supported to maintain commodity production, but the long-term outcome is typically a loss of commodity production capability.

A traditional commodity production emphasis assumes that a single species approach for recovery of threatened, endangered, candidate, or sensitive species is used to conserve current native species diversity. Stronghold or relic populations of threatened, endangered, candidate, or sensitive species may be protected from human disturbance of habitats. However, these habitats may be at high risk to system disturbances as well as in conflict with other species habitats.

Traditional Reserve (TR) — "protection of current native habitats, aesthetic values, and roadless recreation values."

A traditional reserve emphasis assumes that the area of assessment has a dominant landscape component that is managed for protection of current native habitats, aesthetic values, and roadless recreation values. Emphasis is on multiple, but relatively independent management of various resources (fire protection, forage, roadless recreation, wilderness, wildlife, fisheries, and water) for sustained yield of the resource.

*The geologic, geomorphic, pedogenic, climatic, hydrologic, and carbon-nutrient systems are typically not functioning similar to the native (HRV) system. These systems are typically not shifting in a resilient manner to current and potential future climate change and geologic events.

*Terrestrial and aquatic systems (species and habitats) may be functioning to some extent as native systems. Generally the composition and structure will be well outside of HRV and there may be low to moderate risk of permanent alteration to biophysical potentials. The departure from HRV often results in moderate risk of severe disturbance and potential loss of aesthetic values, native diversity, and biophysical potential. Attempts to mitigate for loss of system capabilities, reduced native diversity, and increasing risk of species extinctions typically are unsuccessful because of the high cost of investments and lack of funds for this type of land use management.

A traditional reserve emphasis assumes that low management activity energy is needed for management of human values and needs. However, substantial emphasis is required for protection to control disturbance and conserve current native diversity of the terrestrial and aquatic systems.

A traditional reserve emphasis assumes that human values and needs will flow from management systems that are in conflict with ecological relationships and landscape limitations. Mitigation is typically used to conserve current native composition, structure, and disturbance, but these efforts are often unsuccessful because of conflicts with disturbance relationships and landscape limitations. Most systems will need to be artificially managed to control disturbance and provide protection to current conditions. The long-term outcome is typically a loss of native diversity and system capability.

A traditional reserve emphasis assumes that the protection of areas from disturbance and roads will protect native species and habitats. A single species approach for recovery of threatened, endangered, candidate, or sensitive species is used to conserve current native species diversity. Stronghold or relic populations of threatened, endangered, candidate, or sensitive species may be protected from human disturbance of habitats. However, these habitats may be at high risk to system disturbances as well as in conflict with other species habitats.

Traditional Mixed (TM) — mixed traditional commodity production is a mosaic with protection of current native habitats, aesthetic values, and roadless recreation values, where none of the types of management predominate in the area.

Appendix 2-D

Appendix 2-D. Total hectares disturbed during the first decade.

Management Area	Management Class	Alternatives 1	2	3	4	5	6	7
Forest - Harvest								
EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
EEIS	BLM/FS Other	615700	357700	424200	419200	438100	400900	295800
UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
UCRB	BLM/FS Other	572300	250400	390000	324000	392500	265400	204000
Forest - Thinning								
EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
EEIS	BLM/FS Other	158600	77200	117600	116600	114200	112000	66500
UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
UCRB	BLM/FS Other	264600	91200	159300	162600	162300	145000	103900
Forest - Prescribed Fire								
EEIS	BLM/FS Natural Processes	24700	24700	163700	163700	156600	153200	76600
EEIS	BLM/FS Other	95900	70200	718900	719900	677200	712600	419300
UCRB	BLM/FS Natural Processes	77600	77600	377200	377200	283900	279900	44700
UCRB	BLM/FS Other	77600	117200	805200	809200	692900	736800	378000
Forest -Wildfire								
EEIS	BLM/FS Natural Processes	101300	101300	71200	71200	75100	77600	147500
EEIS	BLM/FS Other	361600	380700	259700	261300	269000	267300	410100
UCRB	BLM/FS Natural Processes	194600	194600	142400	142400	156000	156000	352500
UCRB	BLM/FS Other	404700	433300	294300	292600	318100	315200	436500
Range - Exotics								
EEIS	BLM/FS Natural Processes	4800	2000	2000	2000	2000	2000	2100
EEIS	BLM/FS Other	31700	147600	14900	17100	18500	13400	27500
UCRB	BLM/FS Natural Processes	3000	2900	2900	2900	2900	2900	1700
UCRB	BLM/FS Other	85500	109800	43200	45900	65000	23700	32200
Range - Prescribed Fire								
EEIS	BLM/FS Natural Processes	0	9000	9000	9000	9000	9000	7500
EEIS	BLM/FS Other	51400	45900	336000	384400	330900	375100	320600
UCRB	BLM/FS Natural Processes	0	4900	4900	4900	4900	4900	400
UCRB	BLM/FS Other	27400	23500	112500	122200	48400	60500	57700
Range - Range Improvement								
EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
EEIS	BLM/FS Other	20600	20700	83600	148000	53300	115200	86300
UCRB	BLM/FS Natural Processes	0	100	100	100	100	100	0
UCRB	BLM/FS Other	11800	11200	139200	213200	55000	129600	65000

Appendix 2-D (continued).

Management Area	Management Class	Alternatives 1	2	3	4	5	6	7
Range - Grazing Effects								
EEIS	BLM/FS Natural Processes	297100	298300	298300	298300	298300	298300	214700
EEIS	BLM/FS Other	3800500	2573100	3711000	4238000	3726600	3986500	3102000
UCRB	BLM/FS Natural Processes	47800	49000	49000	49000	49000	49000	42600
UCRB	BLM/FS Other	2231300	1504200	2448800	2613700	2242600	1608500	1148000
Range - Wildfire								
EEIS	BLM/FS Natural Processes	101300	101300	71200	71200	75100	77600	147500
EEIS	BLM/FS Other	361600	380700	259700	261300	269000	267300	410100
UCRB	BLM/FS Natural Processes	194600	194600	142400	142400	156000	156000	352500
UCRB	BLM/FS Other	404700	433300	294300	292600	318100	315200	436500

Appendix 2-E

Appendix 2-E. Total hectares per decade disturbed during the long term (50 to 100 years).

Management Area	Management Class	Alternatives 1	2	3	4	5	6	7
Forest - Harvest								
EEIS	BLM/FS Natural Processes	0	0	20	0	0	0	0
EEIS	BLM/FS Other	551770	325260	399400	391840	400830	374980	266710
EEIS	Other Lands	612280	660970	612280	612280	612280	612280	629230
UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
UCRB	BLM/FS Other	527780	230880	374770	341930	368860	281600	205110
UCRB	Other Lands	418970	434950	418970	418970	418970	418970	420500
Forest - Thinning								
EEIS	BLM/FS Natural Processes	0	0	20	0	0	0	0
EEIS	BLM/FS Other	229270	111550	141390	142710	138680	135560	81020
EEIS	Other Lands	296970	304390	296970	296970	296970	296970	300440
UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
UCRB	BLM/FS Other	285830	93930	137710	138510	151230	123280	92440
UCRB	Other Lands	223980	224970	223980	223980	223980	223980	221090
Forest - Prescribed Fire								
EEIS	BLM/FS Natural Processes	26980	26980	161620	161620	155130	151360	71450
EEIS	BLM/FS Other	116350	97980	770950	772280	731480	763140	450670
EEIS	Other Lands	760	157370	760	760	760	760	37490
UCRB	BLM/FS Natural Processes	81800	81800	361030	361030	278820	273880	41660
UCRB	BLM/FS Other	87460	117180	830690	831530	704150	751870	370450
UCRB	Other Lands	2300	64620	2300	2300	2300	2300	10560
Forest - Wildfire								
EEIS	BLM/FS Natural Processes	109180	109180	73010	73030	76270	77540	153170
EEIS	BLM/FS Other	357860	377060	234700	235460	243670	243640	399720
EEIS	Other Lands	495590	486280	495590	495590	495590	495590	491840
UCRB	BLM/FS Natural Processes	214210	214210	143460	143460	165200	166680	378270
UCRB	BLM/FS Other	427770	472640	301660	304430	333060	337730	481020
UCRB	Other Lands	339870	334540	339870	339870	339870	339870	336530
Range - Exotics								
EEIS	BLM/FS Natural Processes	7410	4720	4720	4720	4720	4720	4340
EEIS	BLM/FS Other	43770	122430	17720	23080	21680	20180	29150
EEIS	Other Lands	285590	285590	285590	285590	285590	253460	245130
UCRB	BLM/FS Natural Processes	3200	3390	3390	3390	3390	3390	2790
UCRB	BLM/FS Other	80910	95410	50040	55660	62250	32360	36700
UCRB	Other Lands	125020	125020	125020	125020	125020	108570	104400

Appendix 2-E (continued).

Management Area	Management Class	Alternatives 1	2	3	4	5	6	7
Range - Prescribed Fire								
EEIS	BLM/FS Natural Processes	30	3240	3240	3240	3240	3240	2770
EEIS	BLM/FS Other	35660	31300	166580	171690	164040	166760	140940
EEIS	Other Lands	202300	202300	202300	202300	202300	197690	181700
UCRB	BLM/FS Natural Processes	0	1090	1090	1090	1090	1090	160
UCRB	BLM/FS Other	23550	20530	63190	64420	34740	36910	29300
UCRB	Other Lands	159300	159300	159300	159300	159300	161260	133080
Range - Range Improvement								
EEIS	BLM/FS Natural Processes	0	10	10	10	10	10	10
EEIS	BLM/FS Other	35050	38080	57870	75310	46980	63780	49710
EEIS	Other Lands	210100	210100	210100	210100	210100	200830	174870
UCRB	BLM/FS Natural Processes	0	10	10	10	10	10	0
UCRB	BLM/FS Other	16640	16730	73460	85780	36200	45680	24430
UCRB	Other Lands	75850	75850	75850	75850	75850	74520	63860
Range - Grazing Effects								
EEIS	BLM/FS Natural Processes	695820	655320	655320	655320	655320	655320	538730
EEIS	BLM/FS Other	3624220	2439530	3397550	3722150	3470740	3552690	2826810
EEIS	Other Lands	3459780	3459780	3459780	3459780	3459780	3814390	3410300
UCRB	BLM/FS Natural Processes	79210	71200	71200	71200	71200	71200	48890
UCRB	BLM/FS Other	2341200	1479500	2421140	2617720	2367560	1753630	1304000
UCRB	Other Lands	2068230	2068230	2068230	2068230	2068230	2028660	1943080
Range - Wildfire								
EEIS	BLM/FS Natural Processes	99650	115280	115280	115280	115280	115280	181930
EEIS	BLM/FS Other	521100	759440	308240	300880	340850	323420	413880
EEIS	Other Lands	713480	713480	713480	713480	713480	668900	732930
UCRB	BLM/FS Natural Processes	77130	84540	84540	84540	84540	84540	156520
UCRB	BLM/FS Other	699260	772380	389500	386750	522580	477550	683140
UCRB	Other Lands	360740	360740	360740	360740	360740	334440	360380

Appendix 2-F. Total hectares disturbed for the first decade by ERU.

ERU NAME	Management Area	Management Class	Alternative 1	2	3	4	5	6	7
Forest - Harvest									
BLUE MOUNTAINS	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
BLUE MOUNTAINS	EEIS	BLM/FS Other	153,600	86,300	118,800	118,800	119,200	114,100	86,400
BLUE MOUNTAINS	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
BLUE MOUNTAINS	UCRB	BLM/FS Other	2,400	600	2,100	2,300	2,000	1,700	100
CENTRAL IDAHO MOUNTAINS	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
CENTRAL IDAHO MOUNTAINS	EEIS	BLM/FS Other	0	100	100	100	100	0	0
CENTRAL IDAHO MOUNTAINS	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
CENTRAL IDAHO MOUNTAINS	UCRB	BLM/FS Other	199,400	59,700	137,800	142,200	112,200	105,900	53,500
COLUMBIA PLATEAU	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
COLUMBIA PLATEAU	EEIS	BLM/FS Other	50,100	27,300	33,400	33,400	34,600	30,900	23,200
COLUMBIA PLATEAU	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
COLUMBIA PLATEAU	UCRB	BLM/FS Other	9,400	2,800	4,300	4,300	4,500	4,000	4,700
LOWER CLARK FORK	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
LOWER CLARK FORK	UCRB	BLM/FS Other	144,000	61,100	98,600	61,800	104,500	57,400	52,100
NORTHERN CASCADES	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
NORTHERN CASCADES	EEIS	BLM/FS Other	53,700	15,700	36,200	35,400	32,400	31,300	700
NORTHERN GLACIATED MOUNTAINS	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
NORTHERN GLACIATED MOUNTAINS	EEIS	BLM/FS Other	65,100	45,600	30,500	27,100	43,700	23,600	25,300
NORTHERN GLACIATED MOUNTAINS	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
NORTHERN GLACIATED MOUNTAINS	UCRB	BLM/FS Other	166,400	107,600	106,700	72,200	130,400	65,900	65,200
NORTHERN GREAT BASIN	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
NORTHERN GREAT BASIN	EEIS	BLM/FS Other	65,700	43,400	35,500	35,500	35,500	34,800	39,800
OWYHEE UPLANDS	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
OWYHEE UPLANDS	EEIS	BLM/FS Other	900	1,200	900	900	900	1,000	1,100
OWYHEE UPLANDS	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
OWYHEE UPLANDS	UCRB	BLM/FS Other	1,600	300	1,300	1,300	1,300	900	1,000
SNAKE HEADWATERS	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
SNAKE HEADWATERS	UCRB	BLM/FS Other	5,100	700	2,600	3,300	3,000	2,400	1,700
SOUTHERN CASCADES	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
SOUTHERN CASCADES	EEIS	BLM/FS Other	83,800	57,100	53,600	52,800	56,500	51,500	19,300
UPPER CLARK FORK	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
UPPER CLARK FORK	UCRB	BLM/FS Other	42,600	17,200	36,100	36,100	34,000	26,500	25,200

Appendix 2-F (continued).

ERU NAME	Management Area	Management Class	Alternative 1	2	3	4	5	6	7
UPPER KLAMATH	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
UPPER KLAMATH	EEIS	BLM/FS Other	142,800	81,000	115,200	115,200	115,200	113,700	100,000
UPPER SNAKE	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
UPPER SNAKE	UCRB	BLM/FS Other	1,400	400	500	500	600	700	500
Forest - Thinning									
BLUE MOUNTAINS	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
BLUE MOUNTAINS	EEIS	BLM/FS Other	64,200	31,000	41,000	41,100	41,200	40,200	29,600
BLUE MOUNTAINS	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
BLUE MOUNTAINS	UCRB	BLM/FS Other	1,700	200	500	500	500	300	0
CENTRAL IDAHO MOUNTAINS	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
CENTRAL IDAHO MOUNTAINS	EEIS	BLM/FS Other	0	0	100	100	100	0	0
CENTRAL IDAHO MOUNTAINS	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
CENTRAL IDAHO MOUNTAINS	UCRB	BLM/FS Other	76,200	20,500	59,500	62,800	52,400	49,700	23,400
COLUMBIA PLATEAU	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
COLUMBIA PLATEAU	EEIS	BLM/FS Other	14,700	5,800	10,100	10,400	9,400	10,000	7,300
COLUMBIA PLATEAU	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
COLUMBIA PLATEAU	UCRB	BLM/FS Other	6,700	1,200	3,000	3,000	2,800	3,200	3,100
LOWER CLARK FORK	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
LOWER CLARK FORK	UCRB	BLM/FS Other	89,900	30,000	56,600	56,900	59,300	55,600	40,200
NORTHERN CASCADES	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
NORTHERN CASCADES	EEIS	BLM/FS Other	19,200	4,200	19,500	19,300	18,400	18,000	1,100
NORTHERN GLACIATED MOUNTAINS	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
NORTHERN GLACIATED MOUNTAINS	EEIS	BLM/FS Other	15,700	8,200	14,900	13,300	14,600	12,300	8,800
NORTHERN GLACIATED MOUNTAINS	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
NORTHERN GLACIATED MOUNTAINS	UCRB	BLM/FS Other	50,500	25,100	22,200	21,800	30,000	21,300	20,200
NORTHERN GREAT BASIN	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
NORTHERN GREAT BASIN	EEIS	BLM/FS Other	11,000	5,400	9,400	9,400	9,400	9,200	7,500
OWYHEE UPLANDS	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
OWYHEE UPLANDS	EEIS	BLM/FS Other	100	100	100	100	100	300	600
OWYHEE UPLANDS	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
OWYHEE UPLANDS	UCRB	BLM/FS Other	1,900	400	700	700	700	800	1,600
SNAKE HEADWATERS	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
SNAKE HEADWATERS	UCRB	BLM/FS Other	6,100	1,100	1,700	1,800	1,800	1,200	1,600
SOUTHERN CASCADES	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0

Appendix 2-F (continued).

ERU NAME	Management Area	Management Class	Alternative 1	2	3	4	5	6	7
SOUTHERN CASCADES	EEIS	BLM/FS Other	15,400	12,000	11,300	11,700	9,800	10,800	2,300
UPPER CLARK FORK	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
UPPER CLARK FORK	UCRB	BLM/FS Other	30,900	12,700	14,900	14,900	14,600	12,700	13,700
UPPER KLAMATH	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
UPPER KLAMATH	EEIS	BLM/FS Other	18,300	10,500	11,200	11,200	11,200	11,200	9,300
UPPER SNAKE	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
UPPER SNAKE	UCRB	BLM/FS Other	700	0	200	200	200	200	100
Forest - Prescribed Fire									
BLUE MOUNTAINS	EEIS	BLM/FS Natural Processes	8,700	8,700	60,200	60,200	60,200	58,100	21,000
BLUE MOUNTAINS	EEIS	BLM/FS Other	12,300	9,500	151,400	150,900	150,200	151,000	78,300
BLUE MOUNTAINS	UCRB	BLM/FS Natural Processes	100	100	0	0	0	0	0
BLUE MOUNTAINS	UCRB	BLM/FS Other	0	0	2,300	2,000	1,900	1,700	200
CENTRAL IDAHO MOUNTAINS	EEIS	BLM/FS Natural Processes	300	300	1,300	1,300	1,300	1,300	1,300
CENTRAL IDAHO MOUNTAINS	EEIS	BLM/FS Other	0	0	0	0	0	100	100
CENTRAL IDAHO MOUNTAINS	UCRB	BLM/FS Natural Processes	44,100	44,100	272,900	272,900	215,500	211,800	17,200
CENTRAL IDAHO MOUNTAINS	UCRB	BLM/FS Other	42,500	63,300	394,400	395,100	365,500	349,800	122,100
COLUMBIA PLATEAU	EEIS	BLM/FS Natural Processes	400	400	1,200	1,200	1,200	500	500
COLUMBIA PLATEAU	EEIS	BLM/FS Other	7,000	6,200	37,500	37,300	37,400	35,600	30,500
COLUMBIA PLATEAU	UCRB	BLM/FS Natural Processes	0	0	100	100	100	100	100
COLUMBIA PLATEAU	UCRB	BLM/FS Other	900	400	3,500	3,500	3,600	4,000	5,500
LOWER CLARK FORK	UCRB	BLM/FS Natural Processes	4,600	4,600	16,900	16,900	16,900	16,900	7,700
LOWER CLARK FORK	UCRB	BLM/FS Other	11,300	15,600	138,400	136,100	114,800	136,900	80,100
NORTHERN CASCADES	EEIS	BLM/FS Natural Processes	8,800	8,800	26,100	26,100	19,000	19,000	1,900
NORTHERN CASCADES	EEIS	BLM/FS Other	4,500	7,000	47,200	47,100	38,900	41,700	2,700
NORTHERN GLACIATED MOUNTAINS	EEIS	BLM/FS Natural Processes	1,600	1,600	6,200	6,200	6,200	5,600	5,600
NORTHERN GLACIATED MOUNTAINS	EEIS	BLM/FS Other	2,700	5,300	48,400	47,200	36,200	45,500	27,400
NORTHERN GLACIATED MOUNTAINS	UCRB	BLM/FS Natural Processes	21,200	21,200	65,600	65,600	29,700	29,700	9,100
NORTHERN GLACIATED MOUNTAINS	UCRB	BLM/FS Other	15,900	21,200	171,000	175,700	111,600	157,000	118,300
NORTHERN GREAT BASIN	EEIS	BLM/FS Natural Processes	600	600	20,000	20,000	20,000	20,000	19,800
NORTHERN GREAT BASIN	EEIS	BLM/FS Other	12,400	9,000	84,000	84,000	84,000	84,700	78,300
OWYHEE UPLANDS	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
OWYHEE UPLANDS	EEIS	BLM/FS Other	0	0	100	100	100	200	200
OWYHEE UPLANDS	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
OWYHEE UPLANDS	UCRB	BLM/FS Other	100	100	200	200	200	300	300

Appendix 2-F (continued).

ERU NAME	Management Area	Management Class	Alternative 1	2	3	4	5	6	7
SNAKE HEADWATERS	UCRB	BLM/FS Natural Processes	0	0	400	400	400	100	100
SNAKE HEADWATERS	UCRB	BLM/FS Other	4,100	3,400	19,500	20,700	20,100	15,100	4,600
SOUTHERN CASCADES	EEIS	BLM/FS Natural Processes	2,100	2,100	9,100	9,100	9,100	9,100	0
SOUTHERN CASCADES	EEIS	BLM/FS Other	11,500	8,300	78,200	81,200	58,300	81,800	4,000
UPPER CLARK FORK	UCRB	BLM/FS Natural Processes	7,600	7,600	21,300	21,300	21,300	21,300	10,500
UPPER CLARK FORK	UCRB	BLM/FS Other	2,700	13,100	75,500	75,500	74,900	71,800	45,500
UPPER KLAMATH	EEIS	BLM/FS Natural Processes	2,200	2,200	39,600	39,600	39,600	39,600	26,500
UPPER KLAMATH	EEIS	BLM/FS Other	45,500	24,900	272,100	272,100	272,100	272,000	197,800
UPPER SNAKE	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
UPPER SNAKE	UCRB	BLM/FS Other	100	100	400	400	300	200	1,400
Forest - Wildfire									
BLUE MOUNTAINS	EEIS	BLM/FS Natural Processes	33,200	33,200	26,200	26,200	26,200	27,500	65,700
BLUE MOUNTAINS	EEIS	BLM/FS Other	112,100	109,600	83,200	83,100	83,300	83,200	112,600
BLUE MOUNTAINS	UCRB	BLM/FS Natural Processes	200	200	100	100	100	100	300
BLUE MOUNTAINS	UCRB	BLM/FS Other	3,300	2,300	2,200	2,100	2,200	2,100	6,400
CENTRAL IDAHO MOUNTAINS	EEIS	BLM/FS Natural Processes	500	500	200	200	200	200	200
CENTRAL IDAHO MOUNTAINS	EEIS	BLM/FS Other	0	0	0	0	0	0	0
CENTRAL IDAHO MOUNTAINS	UCRB	BLM/FS Natural Processes	137,600	137,600	99,100	99,100	108,900	108,700	279,400
CENTRAL IDAHO MOUNTAINS	UCRB	BLM/FS Other	208,200	230,200	151,100	149,900	163,700	164,900	245,000
COLUMBIA PLATEAU	EEIS	BLM/FS Natural Processes	1,500	1,500	1,300	1,300	1,300	1,300	1,300
COLUMBIA PLATEAU	EEIS	BLM/FS Other	25,900	26,500	19,400	19,400	18,600	19,300	22,300
COLUMBIA PLATEAU	UCRB	BLM/FS Natural Processes	500	500	600	600	600	600	600
COLUMBIA PLATEAU	UCRB	BLM/FS Other	3,800	3,500	2,900	2,900	3,100	3,200	2,800
LOWER CLARK FORK	UCRB	BLM/FS Natural Processes	8,500	8,500	6,000	6,000	6,000	6,000	8,400
LOWER CLARK FORK	UCRB	BLM/FS Other	58,100	59,800	40,600	38,100	44,200	38,100	50,200
NORTHERN CASCADES	EEIS	BLM/FS Natural Processes	33,400	33,400	20,500	20,500	24,400	24,400	41,900
NORTHERN CASCADES	EEIS	BLM/FS Other	58,300	59,900	39,900	41,600	44,600	44,600	108,000
NORTHERN GLACIATED MOUNTAINS	EEIS	BLM/FS Natural Processes	3,800	3,800	3,100	3,100	3,100	4,300	4,300
NORTHERN GLACIATED MOUNTAINS	EEIS	BLM/FS Other	25,400	32,700	18,900	19,200	20,500	20,700	24,800
NORTHERN GLACIATED MOUNTAINS	UCRB	BLM/FS Natural Processes	29,200	29,200	22,000	22,000	25,800	25,800	39,600
NORTHERN GLACIATED MOUNTAINS	UCRB	BLM/FS Other	65,200	64,600	47,500	50,100	54,600	54,800	62,700
NORTHERN GREAT BASIN	EEIS	BLM/FS Natural Processes	4,400	4,400	2,700	2,700	2,700	2,700	3,000
NORTHERN GREAT BASIN	EEIS	BLM/FS Other	28,900	27,800	24,900	24,900	24,900	24,300	22,500
OWYHEE UPLANDS	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	700

Appendix 2-F (continued).

ERU NAME	Management Area	Management Class	Alternative 1	2	3	4	5	6	7
OWYHEE UPLANDS	EEIS	BLM/FS Other	1,400	1,700	1,500	1,500	1,500	2,000	1,300
OWYHEE UPLANDS	UCRB	BLM/FS Natural Processes	3,500	3,500	1,700	1,700	1,700	1,800	8,000
OWYHEE UPLANDS	UCRB	BLM/FS Other	3,000	4,000	2,500	2,500	2,600	2,900	3,400
SNAKE HEADWATERS	UCRB	BLM/FS Natural Processes	500	500	300	300	300	400	400
SNAKE HEADWATERS	UCRB	BLM/FS Other	9,600	10,800	7,400	6,900	6,700	7,100	10,700
SOUTHERN CASCADES	EEIS	BLM/FS Natural Processes	11,900	11,900	8,600	8,600	8,600	8,600	16,700
SOUTHERN CASCADES	EEIS	BLM/FS Other	41,400	47,900	28,600	28,300	32,300	29,300	65,500
UPPER CLARK FORK	UCRB	BLM/FS Natural Processes	14,600	14,600	12,500	12,500	12,500	12,500	15,700
UPPER CLARK FORK	UCRB	BLM/FS Other	52,000	57,200	38,000	38,000	39,000	40,800	54,000
UPPER KLAMATH	EEIS	BLM/FS Natural Processes	12,600	12,600	8,600	8,600	8,600	8,600	13,700
UPPER KLAMATH	EEIS	BLM/FS Other	68,200	74,600	43,300	43,300	43,300	43,900	53,100
UPPER SNAKE	UCRB	BLM/FS Natural Processes	0	0	100	100	100	100	100
UPPER SNAKE	UCRB	BLM/FS Other	1,500	900	2,100	2,100	2,000	1,300	1,300
Range - Exotics									
BLUE MOUNTAINS	EEIS	BLM/FS Natural Processes	500	400	400	400	400	400	200
BLUE MOUNTAINS	EEIS	BLM/FS Other	4,300	5,000	2,600	2,800	2,800	2,700	2,900
BLUE MOUNTAINS	UCRB	BLM/FS Natural Processes	100	0	0	0	0	0	0
BLUE MOUNTAINS	UCRB	BLM/FS Other	1,200	200	900	1,300	1,100	700	300
CENTRAL IDAHO MOUNTAINS	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
CENTRAL IDAHO MOUNTAINS	UCRB	BLM/FS Natural Processes	500	900	900	900	900	900	400
CENTRAL IDAHO MOUNTAINS	UCRB	BLM/FS Other	20,500	3,700	10,900	10,800	18,000	7,600	6,100
COLUMBIA PLATEAU	EEIS	BLM/FS Natural Processes	400	100	100	100	100	100	100
COLUMBIA PLATEAU	EEIS	BLM/FS Other	4,300	10,900	2,100	2,200	2,100	2,100	3,100
COLUMBIA PLATEAU	UCRB	BLM/FS Natural Processes	0	100	100	100	100	100	100
COLUMBIA PLATEAU	UCRB	BLM/FS Other	800	100	100	400	400	400	400
LOWER CLARK FORK	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
LOWER CLARK FORK	UCRB	BLM/FS Other	0	0	0	0	0	0	0
NORTHERN CASCADES	EEIS	BLM/FS Natural Processes	100	0	0	0	0	0	300
NORTHERN CASCADES	EEIS	BLM/FS Other	600	100	900	900	400	200	0
NORTHERN GLACIATED MOUNTAINS	EEIS	BLM/FS Other	100	100	100	100	100	100	0
NORTHERN GLACIATED MOUNTAINS	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
NORTHERN GLACIATED MOUNTAINS	UCRB	BLM/FS Other	0	0	100	100	100	0	0
NORTHERN GREAT BASIN	EEIS	BLM/FS Natural Processes	2,000	1,000	1,000	1,000	1,000	1,000	1,000
NORTHERN GREAT BASIN	EEIS	BLM/FS Other	8,400	87,700	3,100	3,500	5,100	1,900	11,100
OWYHEE UPLANDS	EEIS	BLM/FS Natural Processes	1,700	500	500	500	500	500	500

Appendix 2-F (continued).

ERU NAME	Management Area	Management Class	Alternative 1	2	3	4	5	6	7
OWYHEE UPLANDS	EEIS	BLM/FS Other	12,300	43,600	5,600	7,400	7,500	6,100	10,300
OWYHEE UPLANDS	UCRB	BLM/FS Natural Processes	2,300	1,900	1,900	1,900	1,900	1,900	1,200
OWYHEE UPLANDS	UCRB	BLM/FS Other	52,200	67,200	27,400	29,500	40,600	11,200	16,000
SNAKE HEADWATERS	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
SNAKE HEADWATERS	UCRB	BLM/FS Other	500	100	600	400	600	200	200
SOUTHERN CASCADES	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
SOUTHERN CASCADES	EEIS	BLM/FS Other	600	100	100	100	100	300	100
UPPER CLARK FORK	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
UPPER CLARK FORK	UCRB	BLM/FS Other	700	100	200	200	200	400	100
UPPER KLAMATH	EEIS	BLM/FS Natural Processes	100	0	0	0	0	0	0
UPPER KLAMATH	EEIS	BLM/FS Other	1,100	100	400	100	400	0	0
UPPER SNAKE	UCRB	BLM/FS Natural Processes	100	0	0	0	0	0	0
UPPER SNAKE	UCRB	BLM/FS Other	9,600	38,400	3,000	3,200	4,000	3,200	9,100
Range - Prescribed Fire			100	0	0	0	0	0	0
BLUE MOUNTAINS	EEIS	BLM/FS Natural Processes	0	100	100	100	100	100	100
BLUE MOUNTAINS	EEIS	BLM/FS Other	2,200	1,800	16,200	16,800	16,100	16,200	13,700
BLUE MOUNTAINS	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
BLUE MOUNTAINS	UCRB	BLM/FS Other	100	0	100	100	100	300	0
CENTRAL IDAHO MOUNTAINS	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
CENTRAL IDAHO MOUNTAINS	UCRB	BLM/FS Natural Processes	0	400	400	400	400	400	400
CENTRAL IDAHO MOUNTAINS	UCRB	BLM/FS Other	2,900	2,300	23,700	24,700	2,100	6,400	4,600
COLUMBIA PLATEAU	EEIS	BLM/FS Natural Processes	0	5,700	5,700	5,700	5,700	5,700	5,700
COLUMBIA PLATEAU	EEIS	BLM/FS Other	33,600	33,900	244,600	284,900	242,600	284,700	262,300
COLUMBIA PLATEAU	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
COLUMBIA PLATEAU	UCRB	BLM/FS Other	0	0	300	300	300	0	0
LOWER CLARK FORK	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
LOWER CLARK FORK	UCRB	BLM/FS Other	0	0	0	0	0	0	0
NORTHERN CASCADES	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
NORTHERN CASCADES	EEIS	BLM/FS Other	0	0	0	0	0	0	0
NORTHERN GLACIATED MOUNTAINS	EEIS	BLM/FS Other	0	0	0	0	0	0	0
NORTHERN GLACIATED MOUNTAINS	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
NORTHERN GLACIATED MOUNTAINS	UCRB	BLM/FS Other	100	0	0	0	0	0	0
NORTHERN GREAT BASIN	EEIS	BLM/FS Natural Processes	0	1,600	1,600	1,600	1,600	1,600	1,500
NORTHERN GREAT BASIN	EEIS	BLM/FS Other	5,600	4,200	30,700	34,600	27,800	31,200	22,900
OWYHEE UPLANDS	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0

Appendix 2-F (continued).

ERU NAME	Management Area	Management Class	Alternative 1	2	3	4	5	6	7
OWYHEE UPLANDS	EEIS	BLM/FS Other	600	400	3,000	4,000	2,900	4,100	3,700
OWYHEE UPLANDS	UCRB	BLM/FS Natural Processes	0	4,400	4,400	4,400	4,400	4,400	0
OWYHEE UPLANDS	UCRB	BLM/FS Other	17,700	15,400	52,000	57,800	22,400	29,100	30,400
SNAKE HEADWATERS	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
SNAKE HEADWATERS	UCRB	BLM/FS Other	100	200	1,600	1,800	1,600	1,700	1,700
SOUTHERN CASCADES	EEIS	BLM/FS Natural Processes	0	1,400	1,400	1,400	1,400	1,400	0
SOUTHERN CASCADES	EEIS	BLM/FS Other	7,100	3,500	24,400	24,400	24,400	19,900	7,200
UPPER CLARK FORK	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
UPPER CLARK FORK	UCRB	BLM/FS Other	200	0	100	100	100	0	0
UPPER KLAMATH	EEIS	BLM/FS Natural Processes	0	200	200	200	200	200	200
UPPER KLAMATH	EEIS	BLM/FS Other	2,300	2,100	17,100	19,700	17,100	19,000	10,800
UPPER SNAKE	UCRB	BLM/FS Natural Processes	0	100	100	100	100	100	0
UPPER SNAKE	UCRB	BLM/FS Other	6,300	5,600	34,700	37,400	21,800	23,000	21,000
Range - Improvement									
BLUE MOUNTAINS	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
BLUE MOUNTAINS	EEIS	BLM/FS Other	800	500	9,200	15,100	7,600	12,400	10,300
BLUE MOUNTAINS	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
BLUE MOUNTAINS	UCRB	BLM/FS Other	0	0	400	500	0	100	0
CENTRAL IDAHO MOUNTAINS	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
CENTRAL IDAHO MOUNTAINS	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
CENTRAL IDAHO MOUNTAINS	UCRB	BLM/FS Other	1,000	1,400	23,700	26,100	2,000	9,500	3,000
COLUMBIA PLATEAU	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
COLUMBIA PLATEAU	EEIS	BLM/FS Other	10,000	8,600	7,700	11,000	5,600	9,600	7,300
COLUMBIA PLATEAU	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
COLUMBIA PLATEAU	UCRB	BLM/FS Other	0	100	700	800	700	300	0
LOWER CLARK FORK	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
LOWER CLARK FORK	UCRB	BLM/FS Other	300	0	100	100	100	100	100
NORTHERN CASCADES	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
NORTHERN CASCADES	EEIS	BLM/FS Other	0	100	800	800	0	100	0
NORTHERN GLACIATED MOUNTAINS	EEIS	BLM/FS Other	0	0	100	0	0	0	0
NORTHERN GLACIATED MOUNTAINS	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
NORTHERN GLACIATED MOUNTAINS	UCRB	BLM/FS Other	100	0	0	0	0	0	0
NORTHERN GREAT BASIN	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
NORTHERN GREAT BASIN	EEIS	BLM/FS Other	4,900	5,600	47,000	76,400	23,200	51,600	30,900
OWYHEE UPLANDS	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0

Appendix 2-F (continued).

ERU NAME	Management Area	Management Class	Alternative 1	2	3	4	5	6	7
OWYHEE UPLANDS	EEIS	BLM/FS Other	2,400	3,200	16,100	42,400	14,200	40,400	36,100
OWYHEE UPLANDS	UCRB	BLM/FS Natural Processes	0	100	100	100	100	100	0
OWYHEE UPLANDS	UCRB	BLM/FS Other	7,700	7,400	72,300	92,300	20,300	38,100	22,300
SNAKE HEADWATERS	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
SNAKE HEADWATERS	UCRB	BLM/FS Other	100	400	2,400	6,800	2,100	6,200	4,000
SOUTHERN CASCADES	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
SOUTHERN CASCADES	EEIS	BLM/FS Other	800	1,000	1,500	1,600	1,500	400	0
UPPER CLARK FORK	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
UPPER CLARK FORK	UCRB	BLM/FS Other	100	100	500	500	500	200	100
UPPER KLAMATH	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
UPPER KLAMATH	EEIS	BLM/FS Other	1,700	1,700	1,200	700	1,200	700	1,700
UPPER SNAKE	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
UPPER SNAKE	UCRB	BLM/FS Other	2,500	1,800	39,100	86,100	29,300	75,100	35,500
Range - Grazing Effects									
BLUE MOUNTAINS	EEIS	BLM/FS Natural Processes	6,400	11,100	11,100	11,100	11,100	11,100	7,700
BLUE MOUNTAINS	EEIS	BLM/FS Other	306,900	207,200	281,400	325,100	279,500	305,400	263,300
BLUE MOUNTAINS	UCRB	BLM/FS Natural Processes	200	500	500	500	500	500	600
BLUE MOUNTAINS	UCRB	BLM/FS Other	6,500	2,700	9,400	10,700	6,600	5,600	4,000
CENTRAL IDAHO MOUNTAINS	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
CENTRAL IDAHO MOUNTAINS	UCRB	BLM/FS Natural Processes	16,300	20,100	20,100	20,100	20,100	20,100	18,000
CENTRAL IDAHO MOUNTAINS	UCRB	BLM/FS Other	570,000	355,100	700,700	710,600	567,300	328,200	239,500
COLUMBIA PLATEAU	EEIS	BLM/FS Natural Processes	3,000	3,100	3,100	3,100	3,100	3,100	3,100
COLUMBIA PLATEAU	EEIS	BLM/FS Other	91,500	54,000	102,500	128,800	101,700	122,000	106,700
COLUMBIA PLATEAU	UCRB	BLM/FS Natural Processes	200	300	300	300	300	300	300
COLUMBIA PLATEAU	UCRB	BLM/FS Other	36,600	26,600	38,600	46,500	39,100	33,800	31,000
LOWER CLARK FORK	UCRB	BLM/FS Natural Processes	500	200	200	200	200	200	200
LOWER CLARK FORK	UCRB	BLM/FS Other	1,200	800	2,300	2,300	2,300	1,000	800
NORTHERN CASCADES	EEIS	BLM/FS Natural Processes	2,900	2,800	2,800	2,800	2,800	2,800	1,100
NORTHERN CASCADES	EEIS	BLM/FS Other	9,000	6,800	3,000	3,800	6,800	4,200	2,300
NORTHERN GLACIATED MOUNTAINS	EEIS	BLM/FS Other	2,100	2,100	3,400	800	2,200	600	1,200
NORTHERN GLACIATED MOUNTAINS	UCRB	BLM/FS Natural Processes	300	200	200	200	200	200	200
NORTHERN GLACIATED MOUNTAINS	UCRB	BLM/FS Other	1,700	1,000	2,000	2,200	2,000	1,200	1,300
NORTHERN GREAT BASIN	EEIS	BLM/FS Natural Processes	182,100	172,000	172,000	172,000	172,000	172,000	98,900
NORTHERN GREAT BASIN	EEIS	BLM/FS Other	2,232,400	1,526,900	2,391,000	2,666,800	2,403,300	2,459,700	1,701,200
OWYHEE UPLANDS	EEIS	BLM/FS Natural Processes	92,900	100,100	100,100	100,100	100,100	100,100	99,100

Appendix 2-F (continued).

ERU NAME	Management Area	Management Class	Alternative 1	2	3	4	5	6	7
OWYHEE UPLANDS	EEIS	BLM/FS Other	1,124,500	749,900	897,000	1,079,200	900,400	1,063,300	1,007,000
OWYHEE UPLANDS	UCRB	BLM/FS Natural Processes	20,000	16,400	16,400	16,400	16,400	16,400	19,100
OWYHEE UPLANDS	UCRB	BLM/FS Other	1,326,800	911,500	1,377,000	1,467,400	1,327,800	948,400	637,700
SNAKE HEADWATERS	UCRB	BLM/FS Natural Processes	100	100	100	100	100	100	200
SNAKE HEADWATERS	UCRB	BLM/FS Other	25,500	17,600	23,400	30,100	23,200	27,200	24,900
SOUTHERN CASCADES	EEIS	BLM/FS Natural Processes	3,700	3,700	3,700	3,700	3,700	3,700	1,100
SOUTHERN CASCADES	EEIS	BLM/FS Other	17,700	14,800	19,400	19,500	19,400	17,500	6,300
UPPER CLARK FORK	UCRB	BLM/FS Natural Processes	300	0	0	0	0	0	0
UPPER CLARK FORK	UCRB	BLM/FS Other	20,300	11,800	22,100	22,100	22,100	10,800	6,300
UPPER KLAMATH	EEIS	BLM/FS Natural Processes	6,100	5,500	5,500	5,500	5,500	5,500	3,700
UPPER KLAMATH	EEIS	BLM/FS Other	16,400	11,400	13,300	14,000	13,300	13,800	14,000
UPPER SNAKE	UCRB	BLM/FS Natural Processes	9,900	11,200	11,200	11,200	11,200	11,200	4,000
UPPER SNAKE	UCRB	BLM/FS Other	242,700	177,100	273,300	321,800	252,200	252,300	202,500
Range - Wildfire									
BLUE MOUNTAINS	EEIS	BLM/FS Natural Processes	9,200	11,200	11,200	11,200	11,200	11,200	51,800
BLUE MOUNTAINS	EEIS	BLM/FS Other	54,000	46,100	32,600	31,600	33,900	31,000	59,200
BLUE MOUNTAINS	UCRB	BLM/FS Natural Processes	300	200	200	200	200	200	700
BLUE MOUNTAINS	UCRB	BLM/FS Other	4,100	3,400	2,500	2,600	3,900	3,100	16,500
CENTRAL IDAHO MOUNTAINS	EEIS	BLM/FS Natural Processes	0	0	0	0	0	0	0
CENTRAL IDAHO MOUNTAINS	UCRB	BLM/FS Natural Processes	17,100	17,900	17,900	17,900	17,900	17,900	71,000
CENTRAL IDAHO MOUNTAINS	UCRB	BLM/FS Other	153,000	120,800	82,000	82,800	116,200	105,100	220,600
COLUMBIA PLATEAU	EEIS	BLM/FS Natural Processes	6,100	7,300	7,300	7,300	7,300	7,300	7,300
COLUMBIA PLATEAU	EEIS	BLM/FS Other	71,200	62,400	44,500	44,600	47,400	45,300	49,200
COLUMBIA PLATEAU	UCRB	BLM/FS Natural Processes	300	0	0	0	0	0	0
COLUMBIA PLATEAU	UCRB	BLM/FS Other	800	400	400	300	400	200	100
LOWER CLARK FORK	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
LOWER CLARK FORK	UCRB	BLM/FS Other	500	300	100	100	100	100	100
NORTHERN CASCADES	EEIS	BLM/FS Natural Processes	2,400	1,900	1,900	1,900	1,900	1,900	13,600
NORTHERN CASCADES	EEIS	BLM/FS Other	2,800	2,400	1,800	1,700	2,500	1,500	5,900
NORTHERN GLACIATED MOUNTAINS	EEIS	BLM/FS Other	600	800	400	300	500	300	400
NORTHERN GLACIATED MOUNTAINS	UCRB	BLM/FS Natural Processes	0	0	0	0	0	0	0
NORTHERN GLACIATED MOUNTAINS	UCRB	BLM/FS Other	500	100	200	200	200	400	100
NORTHERN GREAT BASIN	EEIS	BLM/FS Natural Processes	43,900	54,200	54,200	54,200	54,200	54,200	59,200
NORTHERN GREAT BASIN	EEIS	BLM/FS Other	174,200	198,300	119,900	119,600	131,500	128,500	146,600
OWYHEE UPLANDS	EEIS	BLM/FS Natural Processes	27,400	33,200	33,200	33,200	33,200	33,200	39,500

Appendix 2-F (continued).

ERU NAME	Management Area	Management Class	Alternative 1	2	3	4	5	6	7
OWYHEE UPLANDS	EEIS	BLM/FS Other	107,100	114,500	78,000	80,500	80,700	84,600	91,500
OWYHEE UPLANDS	UCRB	BLM/FS Natural Processes	37,400	42,000	42,000	42,000	42,000	42,000	63,900
OWYHEE UPLANDS	UCRB	BLM/FS Other	310,100	307,100	215,600	214,500	272,100	269,200	315,700
SNAKE HEADWATERS	UCRB	BLM/FS Natural Processes	500	700	700	700	700	700	700
SNAKE HEADWATERS	UCRB	BLM/FS Other	15,300	11,000	10,100	10,400	9,900	10,400	10,600
SOUTHERN CASCADES	EEIS	BLM/FS Natural Processes	600	500	500	500	500	500	2,300
SOUTHERN CASCADES	EEIS	BLM/FS Other	9,900	4,700	2,700	2,600	2,700	3,700	6,700
UPPER CLARK FORK	UCRB	BLM/FS Natural Processes	100	100	100	100	100	100	700
UPPER CLARK FORK	UCRB	BLM/FS Other	4,800	2,400	1,900	1,900	1,900	2,100	4,300
UPPER KLAMATH	EEIS	BLM/FS Natural Processes	500	300	300	300	300	300	500
UPPER KLAMATH	EEIS	BLM/FS Other	8,200	6,700	5,100	6,000	5,100	5,800	5,700
UPPER SNAKE	UCRB	BLM/FS Natural Processes	19,600	21,100	21,100	21,100	21,100	21,100	27,100
UPPER SNAKE	UCRB	BLM/FS Other	101,600	109,200	67,600	68,300	71,000	72,200	95,700

Appendix 2-G. Total hectares per decade disturbed for the long term (50 to 100 years) for potential vegetation group (PVG).

Management Area	Management Class	PVG Group	Alternatives 1	2	3	4	5	6	7
Forest - Harvest									
EEIS	BLM/FS Natural Processes	COLD FOREST	0	0	0	0	0	0	0
EEIS	BLM/FS Natural Processes	DRY FOREST	0	0	20	0	0	0	0
EEIS	BLM/FS Natural Processes	MOIST FOREST	0	0	0	0	0	0	0
EEIS	BLM/FS Other	COLD FOREST	18050	7750	18160	17820	14740	13180	3450
EEIS	BLM/FS Other	DRY FOREST	411760	240730	303690	301700	301600	2951100	2214700
EEIS	BLM/FS Other	MOIST FOREST	1219600	767800	775500	723200	844900	666900	417900
EEIS	Other Lands	COLD FOREST	80900	80300	80900	80900	80900	80900	80300
EEIS	Other Lands	DRY FOREST	4289100	4712900	4289100	4289100	4289100	4289100	4439100
EEIS	Other Lands	MOIST FOREST	1752800	1816500	1752800	1752800	1752800	1752800	1772900
UCRB	BLM/FS Natural Processes	COLD FOREST	0	0	0	0	0	0	0
UCRB	BLM/FS Natural Processes	DRY FOREST	0	0	0	0	0	0	0
UCRB	BLM/FS Natural Processes	MOIST FOREST	0	0	0	0	0	0	0
UCRB	BLM/FS Other	COLD FOREST	647400	190700	494500	517300	403600	331900	199200
UCRB	BLM/FS Other	DRY FOREST	1492900	393800	1071900	1104200	961000	860600	479100
UCRB	BLM/FS Other	MOIST FOREST	3137500	1724300	2181300	1797800	2324000	1623500	1372800
UCRB	Other Lands	COLD FOREST	175300	170500	175300	175300	175300	175300	169000
UCRB	Other Lands	DRY FOREST	2168500	2298400	2168500	2168500	2168500	2168500	2186200
UCRB	Other Lands	MOIST FOREST	1845900	1880600	1845900	1845900	1845900	1845900	1849800
Forest - Thinning									
EEIS	BLM/FS Natural Processes	COLD FOREST	0	0	0	0	0	0	0
EEIS	BLM/FS Natural Processes	DRY FOREST	0	0	200	0	0	0	0
EEIS	BLM/FS Natural Processes	MOIST FOREST	0	0	0	0	0	0	0
EEIS	BLM/FS Other	COLD FOREST	36300	16900	14000	13700	13700	11100	6800
EEIS	BLM/FS Other	DRY FOREST	1606200	794600	937200	934600	935700	901300	627600
EEIS	BLM/FS Other	MOIST FOREST	650200	304000	462700	478800	437400	443200	175800
EEIS	Other Lands	COLD FOREST	6500	3500	6500	6500	6500	6500	5600
EEIS	Other Lands	DRY FOREST	1988900	2081300	1988900	1988900	1988900	1988900	2024800
EEIS	Other Lands	MOIST FOREST	974300	959100	974300	974300	974300	974300	974000
UCRB	BLM/FS Natural Processes	COLD FOREST	0	0	0	0	0	0	0
UCRB	BLM/FS Natural Processes	DRY FOREST	0	0	0	0	0	0	0
UCRB	BLM/FS Natural Processes	MOIST FOREST	0	0	0	0	0	0	0
UCRB	BLM/FS Other	COLD FOREST	304800	104600	26300	27900	37100	44800	66700
UCRB	BLM/FS Other	DRY FOREST	728700	158500	544100	567400	532300	422000	251600
UCRB	BLM/FS Other	MOIST FOREST	1824800	676200	806700	789800	942900	766000	606100
UCRB	Other Lands	COLD FOREST	28200	15900	28200	28200	28200	28200	22200

Appendix 2-G (continued).

Management Area	Management Class	PVG Group	Alternatives 1	2	3	4	5	6	7
UCRB	Other Lands	DRY FOREST	1151200	1246400	1151200	1151200	1151200	1151200	1170600
UCRB	Other Lands	MOIST FOREST	1060400	987400	1060400	1060400	1060400	1060400	1018100
Forest - Prescribed Fire									
EEIS	BLM/FS Natural Processes	COLD FOREST	151000	151000	407600	407600	374500	370900	83900
EEIS	BLM/FS Natural Processes	DRY FOREST	43500	43500	973700	973700	953000	929800	54000
EEIS	BLM/FS Natural Processes	MOIST FOREST	75300	75300	234900	234900	223800	212900	90600
EEIS	BLM/FS Other	COLD FOREST	3100	22100	206300	206200	182100	20060	63400
EEIS	BLM/FS Other	DRY FOREST	1159400	928700	6863600	6866100	6620500	6803000	4210100
EEIS	BLM/FS Other	MOIST FOREST	1000	29000	639600	650500	512200	627800	233200
EEIS	Other Lands	COLD FOREST	4400	4100	4400	4400	4400	4400	4300
EEIS	Other Lands	DRY FOREST	1900	1568300	1900	1900	1900	1900	369300
EEIS	Other Lands	MOIST FOREST	1300	1300	1300	1300	1300	1300	1300
UCRB	BLM/FS Natural Processes	COLD FOREST	442500	442500	1185300	1185300	747700	731000	141200
UCRB	BLM/FS Natural Processes	DRY FOREST	74000	74000	1494100	1494100	1343100	1315100	72400
UCRB	BLM/FS Natural Processes	MOIST FOREST	301500	301500	930900	930900	697400	692700	203000
UCRB	BLM/FS Other	COLD FOREST	114200	494300	1738200	1727100	1402300	1427400	619500
UCRB	BLM/FS Other	DRY FOREST	722500	494700	3865700	3825900	3516900	3397300	1501500
UCRB	BLM/FS Other	MOIST FOREST	37900	182800	2703000	2762300	2122300	2694000	1583500
UCRB	Other Lands	COLD FOREST	19800	19400	19800	19800	19800	19800	19500
UCRB	Other Lands	DRY FOREST	2200	625800	2200	2200	2200	2200	85100
UCRB	Other Lands	MOIST FOREST	1000	1000	1000	1000	1000	1000	1000
Forest - Wildfire									
EEIS	BLM/FS Natural Processes	COLD FOREST	367900	367900	250900	250900	267800	269900	361900
EEIS	BLM/FS Natural Processes	DRY FOREST	447900	447900	272200	272100	277000	287000	789100
EEIS	BLM/FS Natural Processes	MOIST FOREST	276000	276000	207000	207300	217900	218500	380700
EEIS	BLM/FS Other	COLD FOREST	263900	290900	188300	188400	210500	210400	293500
EEIS	BLM/FS Other	DRY FOREST	2584500	2690900	1595200	1601600	1642100	1630800	2686800
EEIS	BLM/FS Other	MOIST FOREST	730200	788800	563500	564600	584100	595200	1016900
EEIS	Other Lands	COLD FOREST	120600	114200	120600	120600	120600	120600	119300
EEIS	Other Lands	DRY FOREST	3925700	3858500	3925700	3925700	3925700	3925700	3901600
EEIS	Other Lands	MOIST FOREST	909600	890100	909600	909600	909600	909600	897500
UCRB	BLM/FS Natural Processes	COLD FOREST	856000	856000	563400	563400	701800	707800	864000
UCRB	BLM/FS Natural Processes	DRY FOREST	742800	742800	453700	453700	490200	497500	2114600
UCRB	BLM/FS Natural Processes	MOIST FOREST	543300	543300	417500	417500	46000	461500	804100
UCRB	BLM/FS Other	COLD FOREST	1158100	1295800	749700	742700	898200	917400	1213500
UCRB	BLM/FS Other	DRY FOREST	1551800	1704900	1061300	1053300	1147800	1154100	1915000
UCRB	BLM/FS Other	MOIST FOREST	1567800	1725700	1205600	1248300	1284600	1305800	1681700
UCRB	Other Lands	COLD FOREST	392300	371700	392300	392300	392300	392300	384300

Appendix 2-G (continued).

Management Area	Management Class	PVG Group	Alternatives 1	2	3	4	5	6	7
UCRB	Other Lands	DRY FOREST	2094000	2123500	2094000	2094000	2094000	2094000	2083500
UCRB	Other Lands	MOIST FOREST	912400	850200	912400	912400	912400	912400	897500
Range - Exotics									
EEIS	BLM/FS Natural Processes	COOL SHRUB	2100	4000	4000	4000	4000	4000	3500
EEIS	BLM/FS Natural Processes	DRY GRASS	16100	13800	13800	13800	13800	13800	11600
EEIS	BLM/FS Natural Processes	DRY SHRUB	55300	29400	29400	29400	29400	29400	28300
EEIS	BLM/FS Natural Processes	WOODLAND	600	0	0	0	0	0	0
EEIS	BLM/FS Other	COOL SHRUB	71400	8100	30200	35400	36100	35600	29500
EEIS	BLM/FS Other	DRY GRASS	50300	1000	42000	50900	40900	39500	25200
EEIS	BLM/FS Other	DRY SHRUB	304000	1202500	99500	137500	133900	119700	23000
EEIS	BLM/FS Other	WOODLAND	12000	3700	5500	7000	5900	7000	6800
EEIS	Other Lands	COOL SHRUB	173900	173900	173900	173900	173900	178000	159700
EEIS	Other Lands	DRY GRASS	765400	765400	765400	765400	765400	774000	764100
EEIS	Other Lands	DRY SHRUB	1902600	1902600	1902600	1902600	1902600	1568500	1511200
EEIS	Other Lands	WOODLAND	8300	8300	8300	8300	8300	8200	8400
UCRB	BLM/FS Natural Processes	COOL SHRUB	5400	16500	16500	16500	16500	16500	15500
UCRB	BLM/FS Natural Processes	DRY GRASS	9700	7400	7400	7400	7400	7400	5000
UCRB	BLM/FS Natural Processes	DRY SHRUB	15400	8900	8900	8900	8900	8900	6900
UCRB	BLM/FS Natural Processes	WOODLAND	1300	1100	1100	1100	1100	1100	400
UCRB	BLM/FS Other	COOL SHRUB	227500	14500	127500	144800	185900	86600	82800
UCRB	BLM/FS Other	DRY GRASS	172100	20600	195400	212800	181200	112500	75900
UCRB	BLM/FS Other	DRY SHRUB	394100	913400	167000	186600	243700	115100	201000
UCRB	BLM/FS Other	WOODLAND	14200	5400	9600	11500	10500	9200	7100
UCRB	Other Lands	COOL SHRUB	202400	202400	202400	202400	202400	212300	190300
UCRB	Other Lands	DRY GRASS	297300	297300	297300	297300	297300	311300	306100
UCRB	Other Lands	DRY SHRUB	736900	736900	736900	736900	736900	548000	532700
UCRB	Other Lands	WOODLAND	7800	7800	7800	7800	7800	7900	7900
Range - Prescribed Fire									
EEIS	BLM/FS Natural Processes	COOL SHRUB	100	31900	31900	31900	31900	31900	27200
EEIS	BLM/FS Natural Processes	DRY GRASS	0	0	0	0	0	0	0
EEIS	BLM/FS Natural Processes	DRY SHRUB	0	500	500	500	500	500	500
EEIS	BLM/FS Natural Processes	WOODLAND	0	0	0	0	0	0	0
EEIS	BLM/FS Other	COOL SHRUB	314200	287900	1630200	1688700	1606500	1640700	1393200
EEIS	BLM/FS Other	DRY GRASS	15200	3700	14500	2500	14100	4300	2300
EEIS	BLM/FS Other	DRY SHRUB	26800	21400	20300	24100	19400	21500	13800
EEIS	BLM/FS Other	WOODLAND	0	0	0	0	0	0	0
EEIS	Other Lands	COOL SHRUB	926300	926300	926300	926300	926300	909100	802300
EEIS	Other Lands	DRY GRASS	478500	478500	478500	478500	478500	490700	480900

Appendix 2-G (continued).

Management Area	Management Class	PVG Group	Alternatives 1	2	3	4	5	6	7
EEIS	Other Lands	DRY SHRUB	568400	568400	568400	568400	568400	526300	507400
EEIS	Other Lands	WOODLAND	0	0	0	0	0	0	0
UCRB	BLM/FS Natural Processes	COOL SHRUB	0	9900	9900	9900	9900	9900	1400
UCRB	BLM/FS Natural Processes	DRY GRASS	0	0	0	0	0	0	0
UCRB	BLM/FS Natural Processes	DRY SHRUB	0	1000	1000	1000	1000	1000	200
UCRB	BLM/FS Natural Processes	WOODLAND	0	0	0	0	0	0	0
UCRB	BLM/FS Other	COOL SHRUB	86200	77500	454500	458500	206300	223600	192100
UCRB	BLM/FS Other	DRY GRASS	30800	2800	43100	41400	35600	23900	8100
UCRB	BLM/FS Other	DRY SHRUB	114900	123500	10030	105900	98500	110200	87700
UCRB	BLM/FS Other	WOODLAND	0	0	19000	21000	0	2000	700
UCRB	Other Lands	COOL SHRUB	507200	507200	507200	507200	507200	505500	373500
UCRB	Other Lands	DRY GRASS	166100	166100	166100	166100	166100	196100	188300
UCRB	Other Lands	DRY SHRUB	477900	477900	477900	477900	477900	465100	413400
UCRB	Other Lands	WOODLAND	0	0	0	0	0	0	0
Range - Improvement									
EEIS	BLM/FS Natural Processes	COOL SHRUB	0	0	0	0	0	0	0
EEIS	BLM/FS Natural Processes	DRY GRASS	0	0	0	0	0	0	0
EEIS	BLM/FS Natural Processes	DRY SHRUB	0	100	100	100	100	100	100
EEIS	BLM/FS Natural Processes	WOODLAND	0	0	0	0	0	0	0
EEIS	BLM/FS Other	COOL SHRUB	292700	28000	183500	193900	181600	188700	181200
EEIS	BLM/FS Other	DRY GRASS	5100	2100	22000	31000	17000	24000	13000
EEIS	BLM/FS Other	DRY SHRUB	52200	97700	372400	527000	270200	424000	301700
EEIS	BLM/FS Other	WOODLAND	0	0	300	400	300	400	400
EEIS	Other Lands	COOL SHRUB	695100	695100	695100	695100	695100	705200	649000
EEIS	Other Lands	DRY GRASS	30020	30020	30020	30020	30020	310400	30020
EEIS	Other Lands	DRY SHRUB	1101900	1101900	1101900	1101900	1101900	981100	788500
EEIS	Other Lands	WOODLAND	1300	1300	1300	1300	1300	1300	1200
UCRB	BLM/FS Natural Processes	COOL SHRUB	0	0	0	0	0	0	0
UCRB	BLM/FS Natural Processes	DRY GRASS	0	0	0	0	0	0	0
UCRB	BLM/FS Natural Processes	DRY SHRUB	0	100	100	100	100	100	0
UCRB	BLM/FS Natural Processes	WOODLAND	0	0	0	0	0	0	0
UCRB	BLM/FS Other	COOL SHRUB	107200	91300	194100	219300	136400	141500	80500
UCRB	BLM/FS Other	DRY GRASS	13100	4800	132500	152200	48200	57100	20500
UCRB	BLM/FS Other	DRY SHRUB	4000	59700	404500	481800	175600	254600	137100
UCRB	BLM/FS Other	WOODLAND	100	0	800	600	500	200	200
UCRB	Other Lands	COOL SHRUB	229100	229100	229100	229100	229100	245400	208000
UCRB	Other Lands	DRY GRASS	10030	10030	10030	10030	10030	116800	110700
UCRB	Other Lands	DRY SHRUB	394300	394300	394300	394300	394300	329000	256700

Management Area	Management Class	PVG Group	Alternatives 1	2	3	4	5	6	7
UCRB	Other Lands	WOODLAND	600	600	600	600	600	700	700
Range - Grazing Effects									
EEIS	BLM/FS Natural Processes	COOL SHRUB	4130	5160	5160	5160	5160	5160	4250
EEIS	BLM/FS Natural Processes	DRY GRASS	17160	23180	23180	23180	23180	23180	17500
EEIS	BLM/FS Natural Processes	DRY SHRUB	597390	556460	556460	556460	556460	556460	502610
EEIS	BLM/FS Natural Processes	WOODLAND	640	1060	1060	1060	1060	1060	1060
EEIS	BLM/FS Other	COOL SHRUB	85820	51620	108520	130730	108630	125800	110490
EEIS	BLM/FS Other	DRY GRASS	95990	46670	78840	82060	82290	68410	47610
EEIS	BLM/FS Other	DRY SHRUB	3260990	2162990	2552990	2850580	2624790	2705980	2464170
EEIS	BLM/FS Other	WOODLAND	6870	2750	6890	6280	6940	6310	5610
EEIS	Other Lands	COOL SHRUB	125110	125110	125110	125110	125110	124630	118140
EEIS	Other Lands	DRY GRASS	1223660	1223660	1223660	1223660	1223660	1221160	1212000
EEIS	Other Lands	DRY SHRUB	1380460	1380460	1380460	1380460	1380460	1773700	1694380
EEIS	Other Lands	WOODLAND	7320	7320	7320	7320	7320	7380	7000
UCRB	BLM/FS Natural Processes	COOL SHRUB	12090	14920	14920	14920	14920	14920	12470
UCRB	BLM/FS Natural Processes	DRY GRASS	10530	11720	11720	11720	11720	11720	20290
UCRB	BLM/FS Natural Processes	DRY SHRUB	54140	42680	42680	42680	42680	42680	14790
UCRB	BLM/FS Other	COOL SHRUB	103670	41040	103380	117200	104100	89830	81990
UCRB	BLM/FS Other	DRY GRASS	1007940	481190	1054740	1135680	966110	587280	375200
UCRB	BLM/FS Other	DRY SHRUB	868250	610820	830910	928700	920250	755840	547870
UCRB	Other Lands	COOL SHRUB	57110	57110	57110	57110	57110	57380	51960
UCRB	Other Lands	DRY GRASS	728090	728090	728090	728090	728090	736040	728540
UCRB	Other Lands	DRY SHRUB	560310	560310	560310	560310	560310	600950	575340
UCRB	Other Lands	WOODLAND	5830	5830	5830	5830	5830	5630	3820
Range - Wildfire									
EEIS	BLM/FS Natural Processes	COOL SHRUB	131600	139900	139900	139900	139900	139900	229800
EEIS	BLM/FS Natural Processes	DRY GRASS	106700	114300	114300	114300	114300	114300	626300
EEIS	BLM/FS Natural Processes	DRY SHRUB	747600	887500	887500	887500	887500	887500	934900
EEIS	BLM/FS Natural Processes	WOODLAND	3600	3800	3800	3800	3800	3800	3800
EEIS	BLM/FS Other	COOL SHRUB	1053700	949800	561200	527900	608300	578800	683300
EEIS	BLM/FS Other	DRY GRASS	271800	189200	143700	144200	151900	149100	363100
EEIS	BLM/FS Other	DRY SHRUB	3852700	6426000	2356400	2315500	2626300	2483800	3063200
EEIS	BLM/FS Other	WOODLAND	17800	16000	11400	12000	11400	12400	14500
EEIS	Other Lands	COOL SHRUB	1010500	1010500	1010500	1010500	1010500	100430	1094000
EEIS	Other Lands	DRY GRASS	688000	688000	688000	688000	688000	675500	685500
EEIS	Other Lands	DRY SHRUB	5392200	5392200	5392200	5392200	5392200	4964500	550050
EEIS	Other Lands	WOODLAND	16100	16100	16100	16100	16100	15900	17700
UCRB	BLM/FS Natural Processes	COOL SHRUB	231600	244400	244400	244400	244400	244400	583100

Appendix 2-G (continued).

Management Area	Management Class	PVG Group	Alternatives 1	2	3	4	5	6	7
UCRB	BLM/FS Natural Processes	DRY GRASS	59900	68500	68500	68500	68500	68500	383900
UCRB	BLM/FS Natural Processes	DRY SHRUB	467800	518900	518900	518900	518900	518900	578900
UCRB	BLM/FS Natural Processes	WOODLAND	5800	7600	7600	7600	7600	7600	13100
UCRB	BLM/FS Other	COOL SHRUB	1855400	1748300	1139000	1103100	1544300	1483200	1963000
UCRB	BLM/FS Other	DRY GRASS	803900	568800	412800	418600	522600	468400	1478900
UCRB	BLM/FS Other	DRY SHRUB	4113000	5231500	2215200	2215100	3017000	2663500	3203500
UCRB	BLM/FS Other	WOODLAND	31200	24800	17000	17400	24400	28200	36200
UCRB	Other Lands	COOL SHRUB	576600	576600	576600	576600	576600	565300	636600
UCRB	Other Lands	DRY GRASS	40060	40060	40060	40060	40060	403500	409700
UCRB	Other Lands	DRY SHRUB	2383500	2383500	2383500	2383500	2383500	2129700	2299900
UCRB	Other Lands	WOODLAND	7400	7400	7400	7400	7400	6500	7000

Appendix 2-H

Appendix 2-H. Percent of Basin Forested and Rangeland PVGs affected by decade by direct forest disturbance (wildfire, prescribed fire, thinning, harvest, seeding, exotic control) by broad-scale alternative.

Vegetation	Ownership		Projection		Alternative						
Type	Class	PVT Group	Years	Historical	1	2	3	4	5	6	7
Forest	BLM/FS	COLD FOREST	First decade	10	10	10	15	15	13	13	9
Forest	BLM/FS	COLD FOREST	Long-term	10	11	11	15	15	13	13	10
Forest	BLM/FS	DRY FOREST	First decade	40	25	18	39	39	38	37	30
Forest	BLM/FS	DRY FOREST	Long-term	40	27	19	39	40	38	37	31
Forest	BLM/FS	MOIST FOREST	First decade	13	17	11	17	16	16	15	13
Forest	BLM/FS	MOIST FOREST	Long-term	13	16	11	17	16	16	16	13
Forest	OTHER	COLD FOREST	First decade	10	9	9	9	9	9	9	9
Forest	OTHER	COLD FOREST	Long-term	10	11	10	11	11	11	11	10
Forest	OTHER	DRY FOREST	First decade	43	31	38	31	31	31	31	32
Forest	OTHER	DRY FOREST	Long-term	43	34	40	34	34	34	34	35
Forest	OTHER	MOIST FOREST	First decade	16	21	22	21	21	21	21	21
Forest	OTHER	MOIST FOREST	Long-term	16	19	19	19	19	19	19	19
Range	BLM/FS	COOL SHRUB	First decade	28	14	13	24	26	23	25	27
Range	BLM/FS	COOL SHRUB	Long-term	28	14	14	16	16	17	16	19
Range	BLM/FS	DRY GRASS	First decade	84	14	10	10	10	10	9	31
Range	BLM/FS	DRY GRASS	Long-term	84	14	10	10	10	11	10	30
Range	BLM/FS	DRY SHRUB	First decade	15	9	10	9	11	9	10	10
Range	BLM/FS	DRY SHRUB	Long-term	15	12	17	9	9	9	9	10
Range	BLM/FS	WOODLAND	First decade	9	5	4	12	14	6	6	6
Range	BLM/FS	WOODLAND	Long-term	9	5	4	5	6	4	4	5
Range	OTHER	COOL SHRUB	First decade	28	24	24	24	24	24	23	22
Range	OTHER	COOL SHRUB	Long-term	28	24	24	24	24	24	24	23
Range	OTHER	DRY GRASS	First decade	76	13	13	13	13	13	14	13
Range	OTHER	DRY GRASS	Long-term	76	16	16	16	16	16	16	16
Range	OTHER	DRY SHRUB	First decade	19	14	14	14	14	14	13	13
Range	OTHER	DRY SHRUB	Long-term	19	20	20	20	20	20	18	19
Range	OTHER	WOODLAND	First decade	9	1	1	1	1	1	1	1
Range	OTHER	WOODLAND	Long-term	9	1	1	1	1	1	1	2

Appendix 2-I

Average yearly hectares of disturbance for BLM/FS lands for long-term simulation years by forest and range cluster group.

Disturbance	Cluster Group	Alternative 1	2	3	4	5	6	7
		Hectares						
Forest-Harvest	F	8941	2671	4725	5974	6958	4627	2453
	H	17322	5152	14931	14931	10777	11577	2751
	J	11037	5396	6788	6788	6788	5681	4628
	L	41732	24421	29566	29566	29566	28509	24240
	M	31301	18766	23043	18072	24754	16696	13993
Forest-Prescribed Fire	F	2354	2488	16181	16294	16559	10713	2332
	H	13946	16191	79622	79622	59620	62261	7444
	J	2206	2649	16975	16975	16975	16826	10972
	L	10457	8920	68091	68091	68091	68051	50793
	M	4109	4669	41479	41580	32258	41765	25620
Forest-Thinning	F	4753	1032	1921	2556	2675	1881	939
	H	8283	2206	4740	4740	3960	4092	1194
	J	5520	2013	2871	2871	2871	2527	1964
	L	16262	8032	8997	8997	8997	8721	6969
	M	17747	7707	9616	9234	10863	8862	6528
Forest-Wildfire	F	8885	9564	6159	5793	5714	7609	10787
	H	48795	52094	32503	32503	39642	38480	78086
	J	10254	10920	7236	7236	7236	7567	11249
	L	29756	30674	19397	19397	19397	19707	25978
	M	20836	22122	15209	15784	16411	16080	22971
Range - Exotics	F	1481	860	900	1123	1119	962	860
	H	1419	371	1435	1453	1534	911	634
	J	131	59	144	156	139	104	74
	L	6339	15333	2510	3373	2550	3219	3222
	M	4289	5995	2704	2719	3989	979	2601
Range - Grazing Effects	F	26101	17823	28277	32769	29123	30808	25684
	H	47149	25314	51060	52274	46734	23782	17163
	J	5865	4274	5874	6004	5963	3988	3295
	L	386117	271464	367272	414513	367239	402709	311851
	M	217101	150887	209357	210171	215249	149645	121232
Range - Prescribed Fire	F	1221	1391	5852	6163	5739	5996	5786
	H	279	108	810	839	164	283	116
	J	62	24	115	108	88	73	23
	L	2868	2795	12324	12734	12241	12377	10433
	M	1569	1318	4624	4656	2273	2319	1171
Range - Rangeland Improvement	F	1110	1006	1239	1560	1012	1308	1098
	H	181	170	1025	1031	220	311	35
	J	22	12	116	130	96	64	31
	L	2852	3225	6096	8723	6015	8422	5849
	M	1098	1228	4720	4739	1043	889	462

Appendix 2-I (continued).

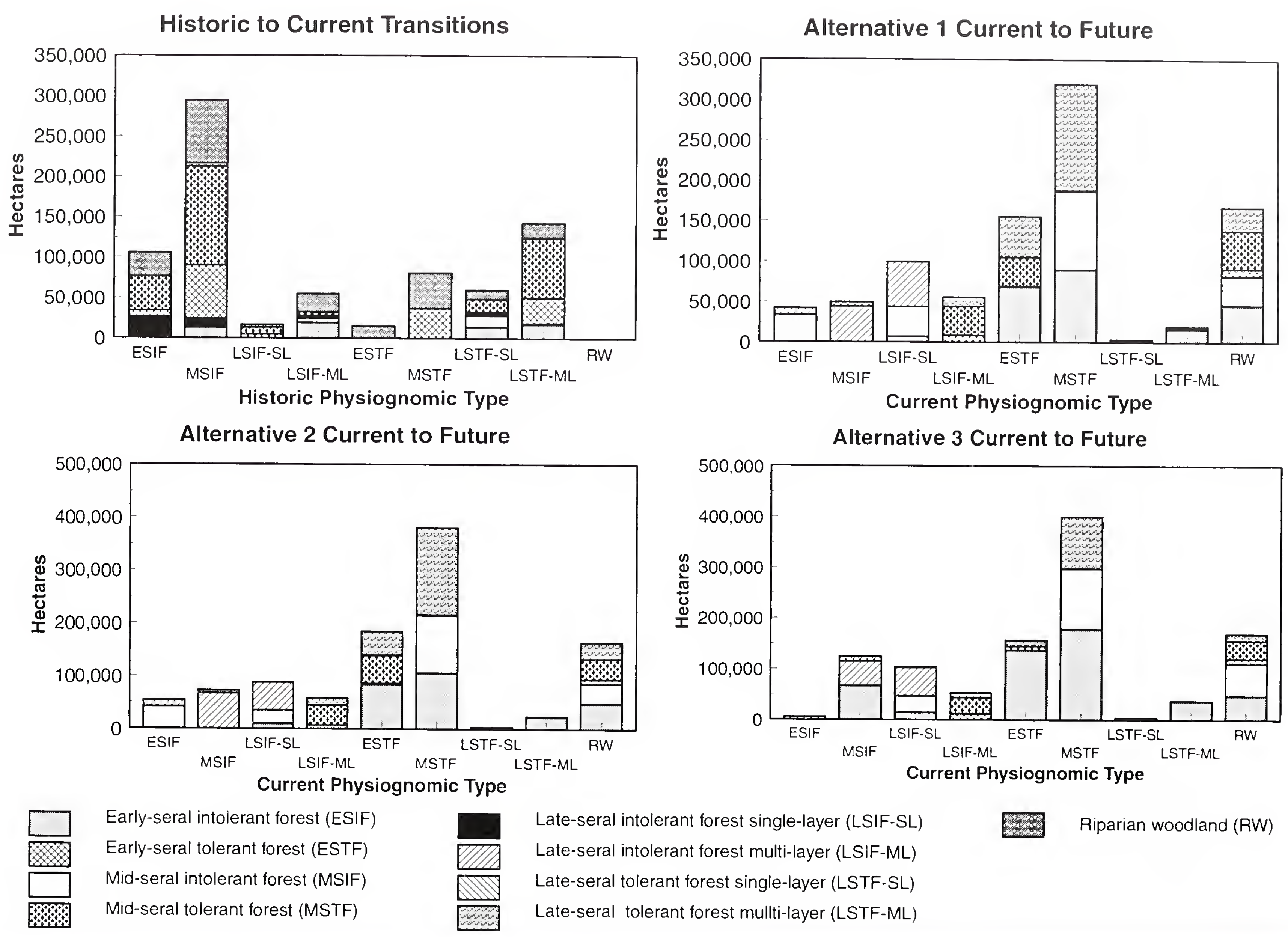
Disturbance	Cluster Group	Alternative						
		1	2	3	4	5	6	7
		Hectares						
Range-Wildfire	F	12506	12116	7538	7349	8584	7858	15390
	H	12977	10334	8305	8192	10608	9217	23732
	J	873	534	408	416	452	475	1061
	L	71861	99485	45930	45113	46257	45730	57937
	M	45154	53504	29772	29789	42968	39228	47967

Appendix 2-J

Transitions of physiognomic types to other physiognomic types by potential vegetation group (PVG) for historic to current and current to alternative futures.

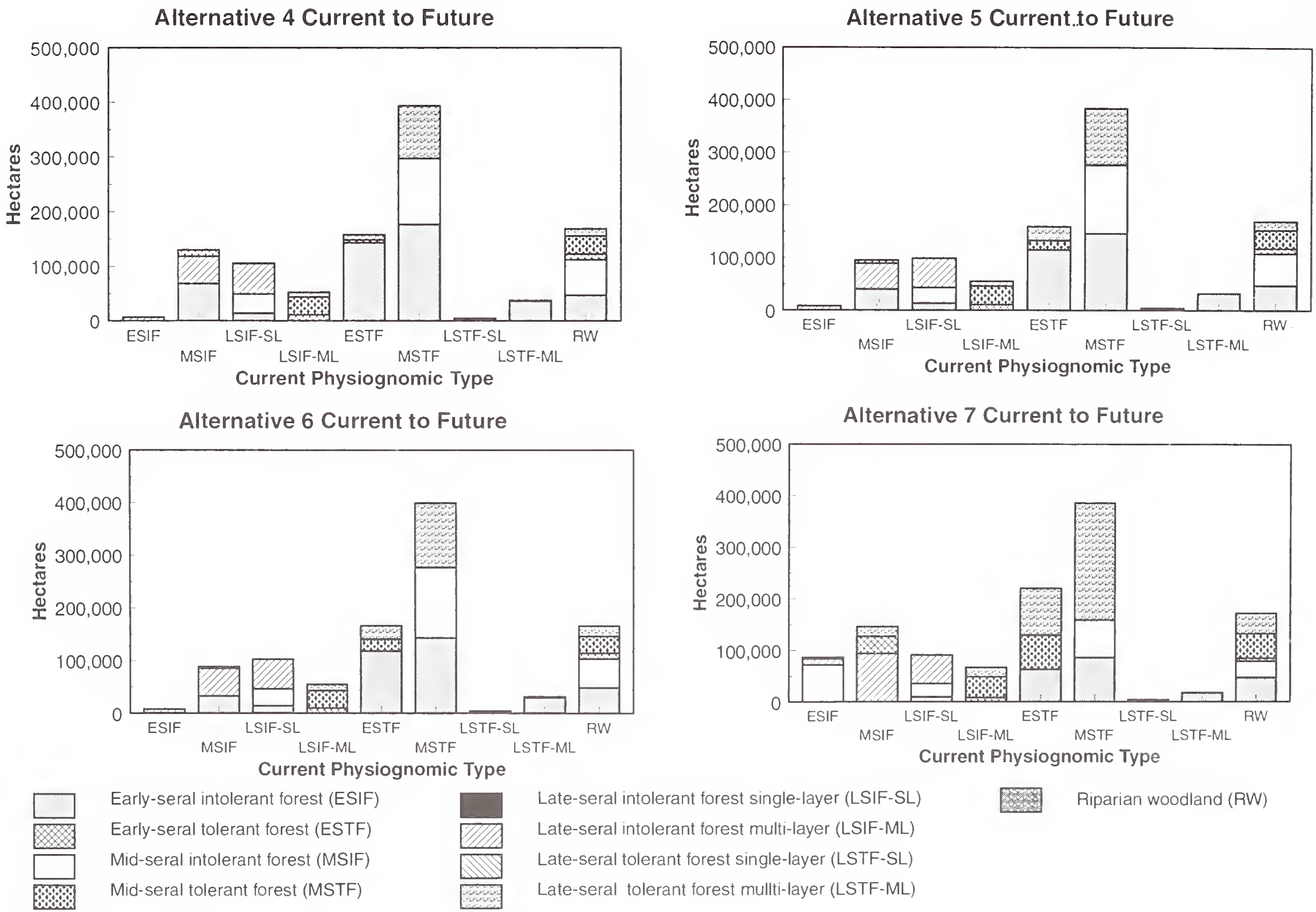
Transitions to Other Physiognomic types -- Cold Forest

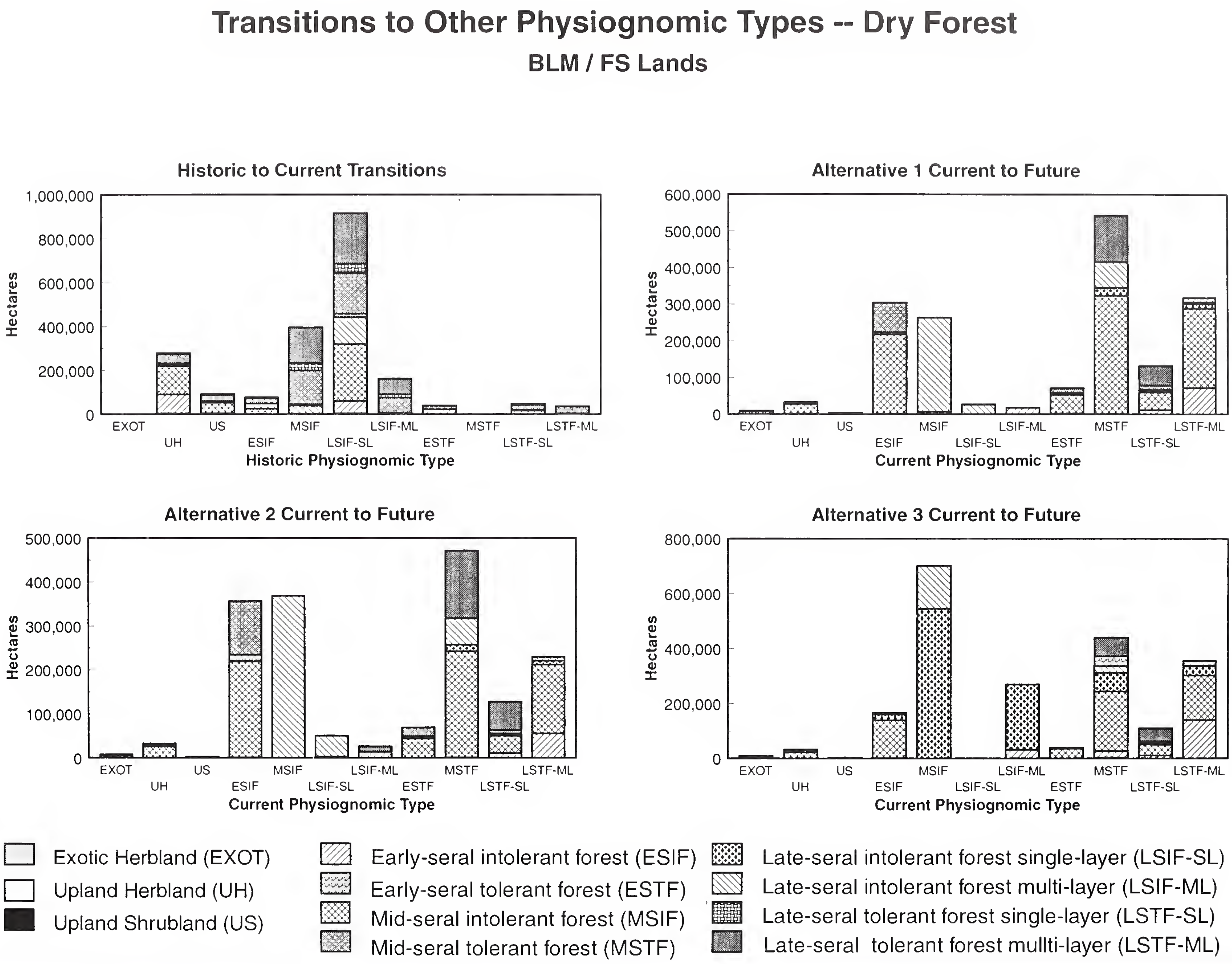
BLM / FS Lands



Transitions to Other Physiognomic Types -- Cold Forest

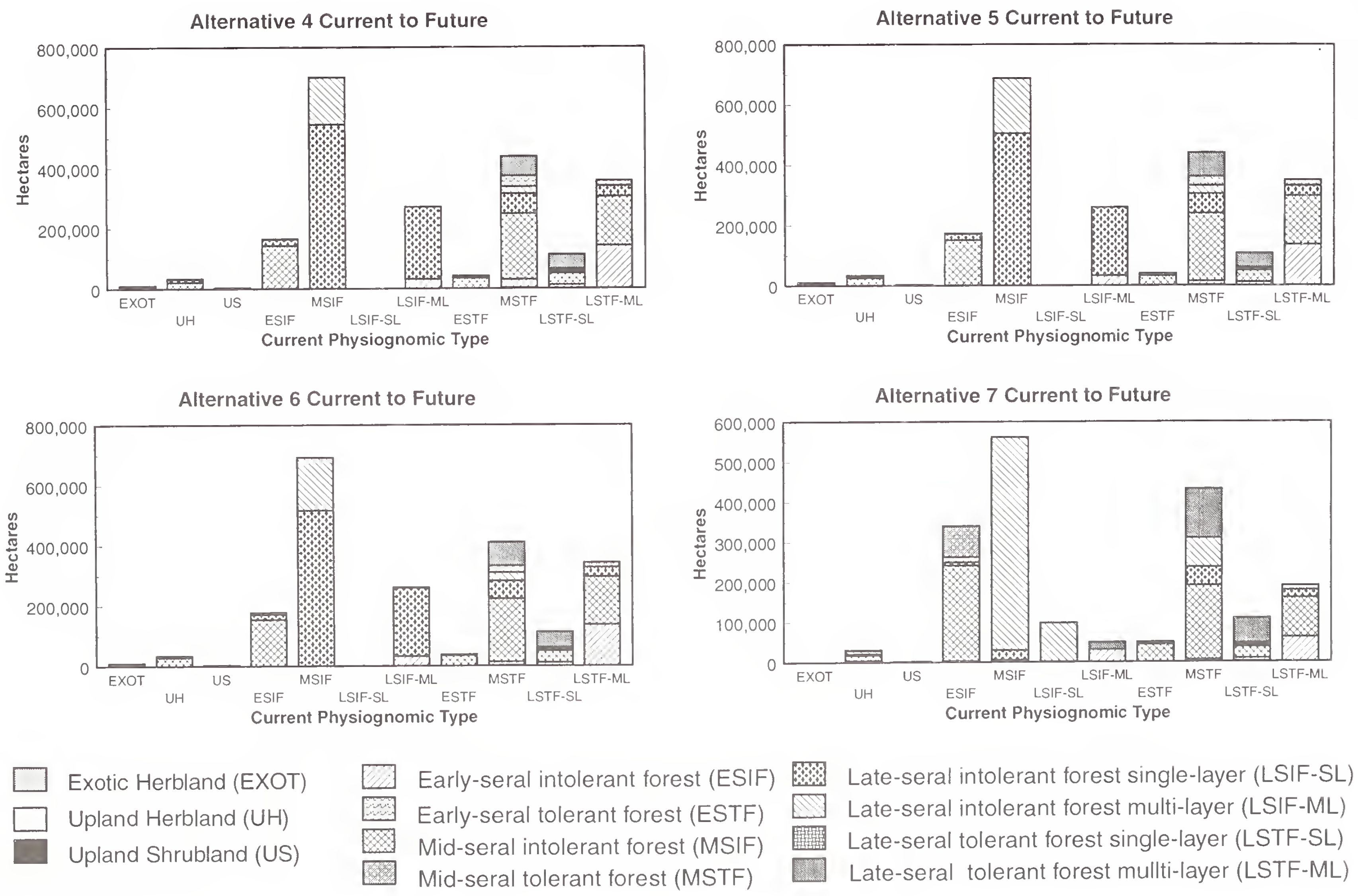
BLM / FS Lands




Transitions to Other Physiognomic Types -- Dry Forest
BLM / FS Lands
Historic to Current Transitions
Alternative 1 Current to Future
Alternative 2 Current to Future
Alternative 3 Current to Future
Hectares
Historic Physiognomic Type
Current Physiognomic Type
EXOT
UH
US
ESIF
MSIF
LSIF-SL
LSIF-ML
ESTF
MSTF
LSTF-SL
LSTF-ML
0
200,000
400,000
600,000
800,000
1,000,000
100,000
300,000
500,000
Exotic Herbland (EXOT)
Upland Herbland (UH)
Upland Shrubland (US)
Early-seral intolerant forest (ESIF)
Early-seral tolerant forest (ESTF)
Mid-seral intolerant forest (MSIF)
Mid-seral tolerant forest (MSTF)
Late-seral intolerant forest single-layer (LSIF-SL)
Late-seral intolerant forest multi-layer (LSIF-ML)
Late-seral tolerant forest single-layer (LSTF-SL)
Late-seral tolerant forest mullti-layer (LSTF-ML)

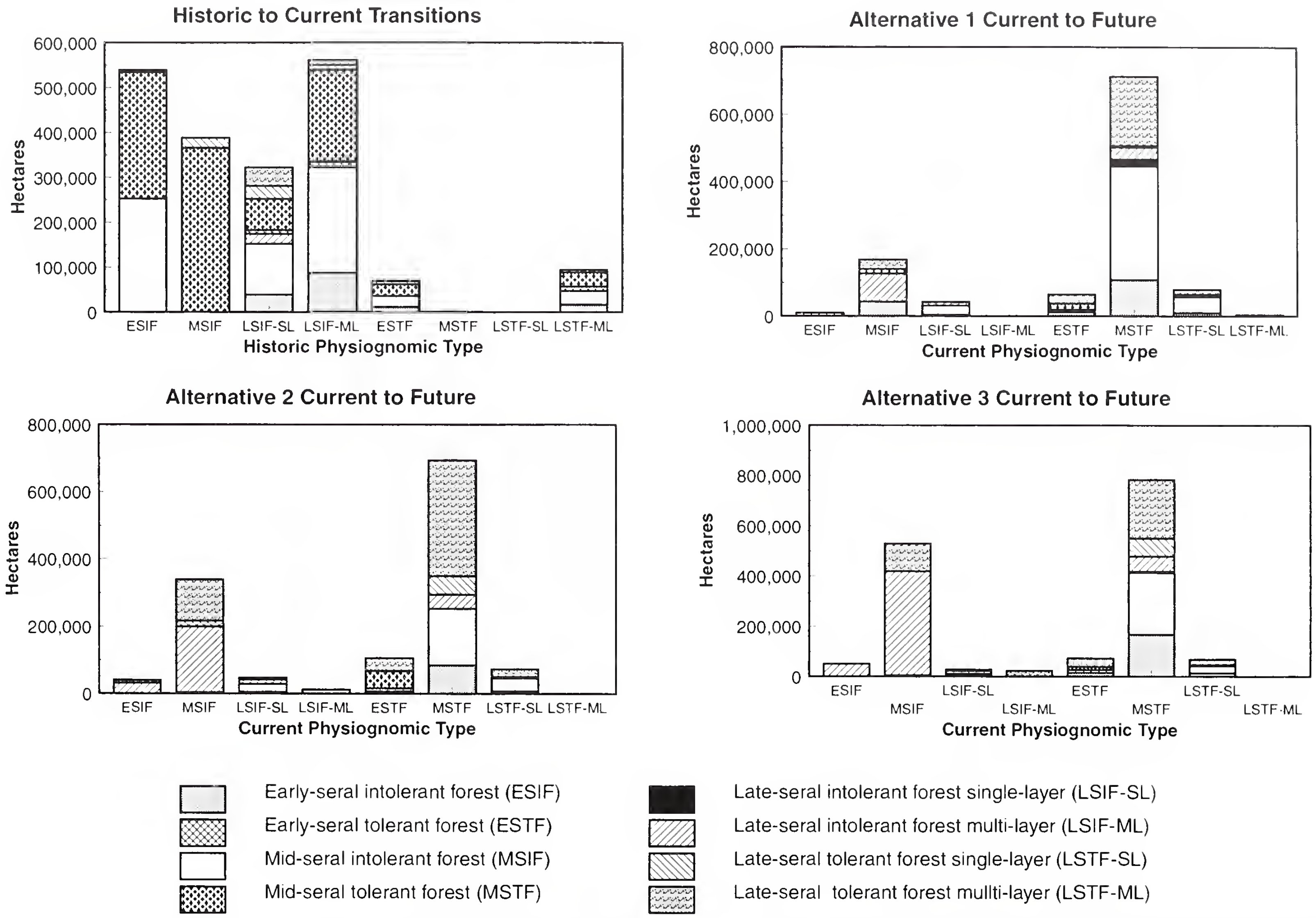
Transitions to Other Physiognomic Types -- Dry Forest

BLM / FS Lands



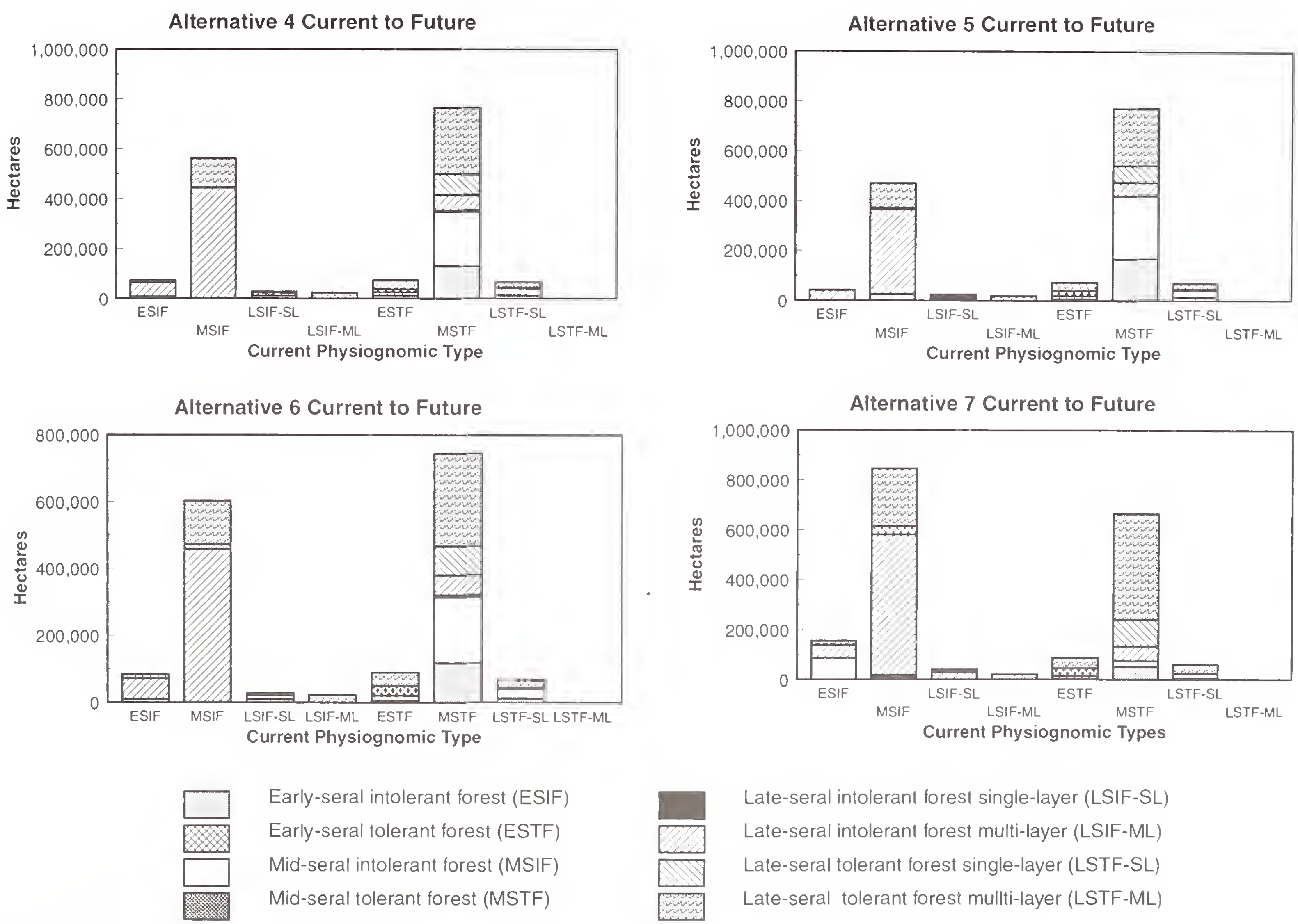
Transitions to Other Physiognomic Types -- Moist Forest

BLM / FS Lands



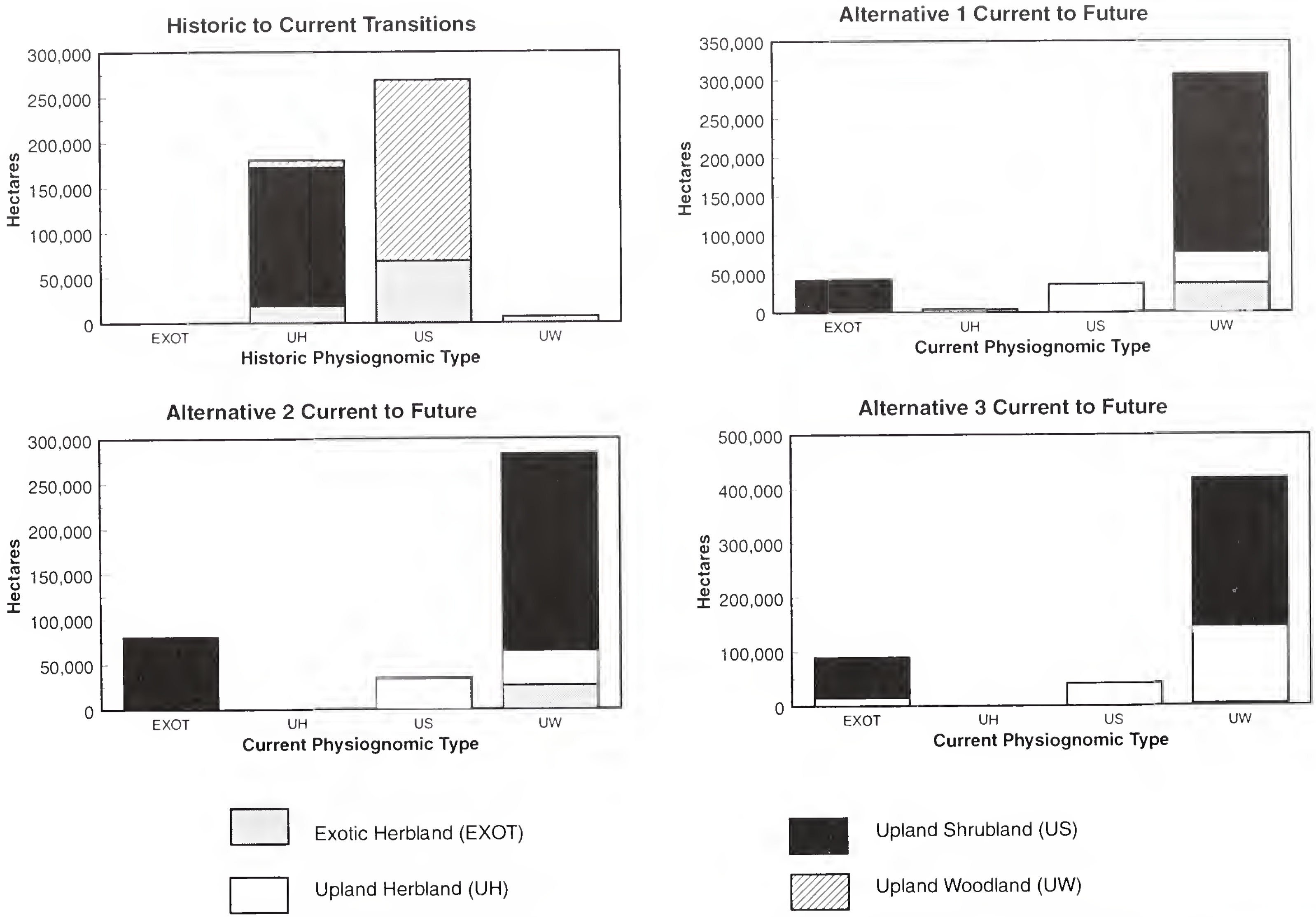
Transitions to Other Physiognomic Types -- Moist Forest

BLM / FS Lands



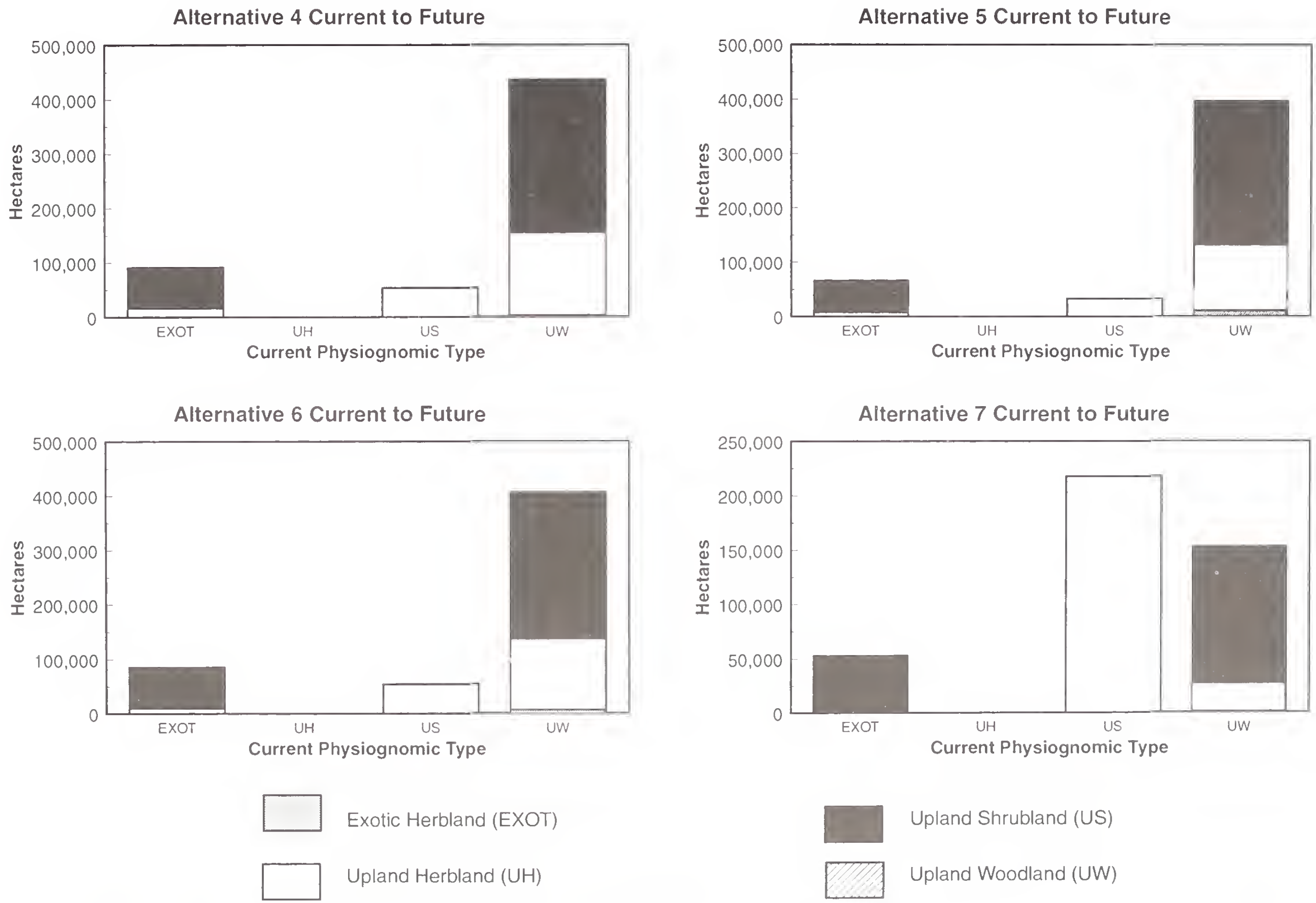
Transitions to Other Physiognomic Types -- Cool Shrub

BLM / FS Lands



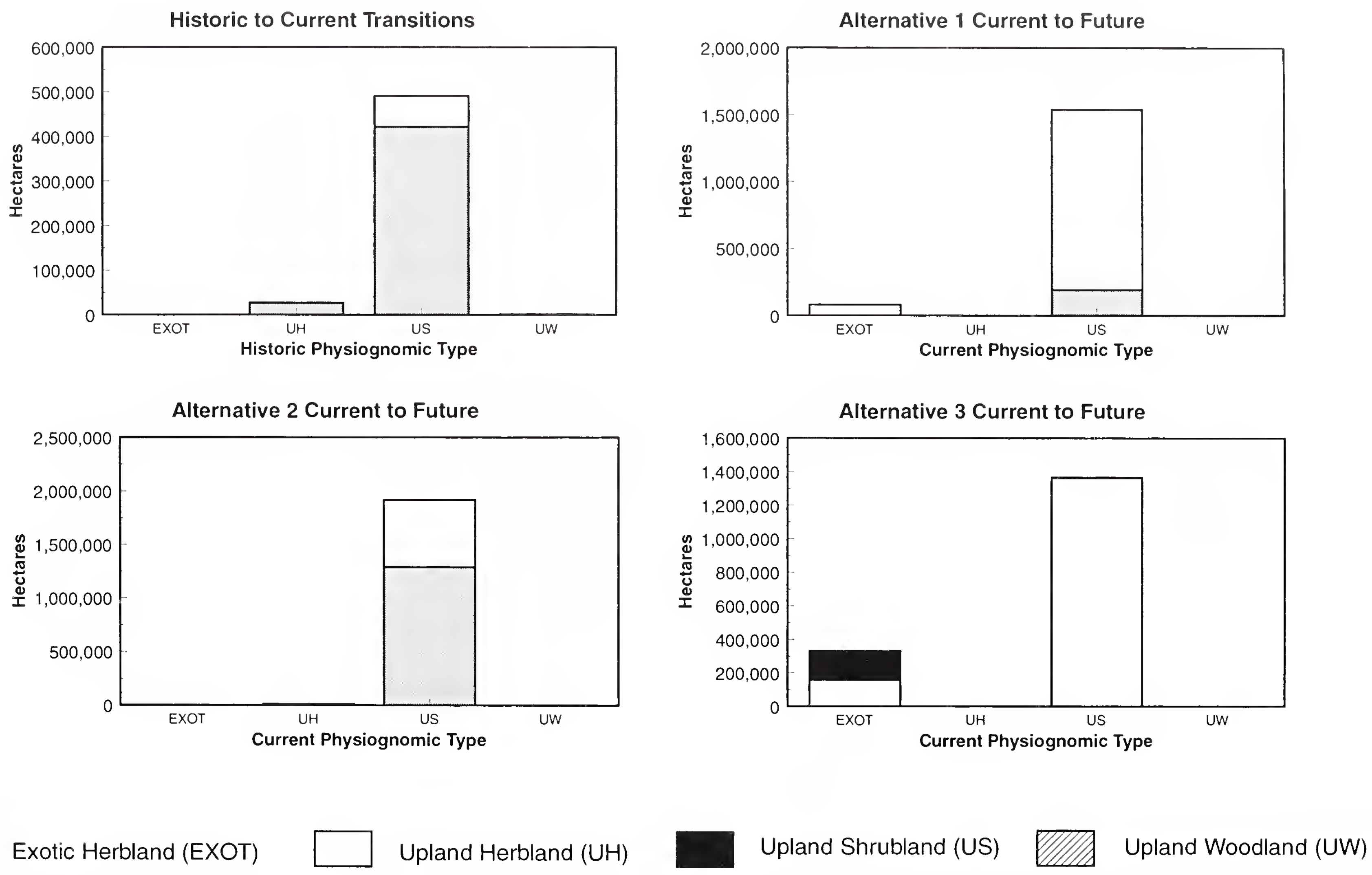
Transitions to Other Physiognomic Types -- Cool Shrub

BLM / FS Lands



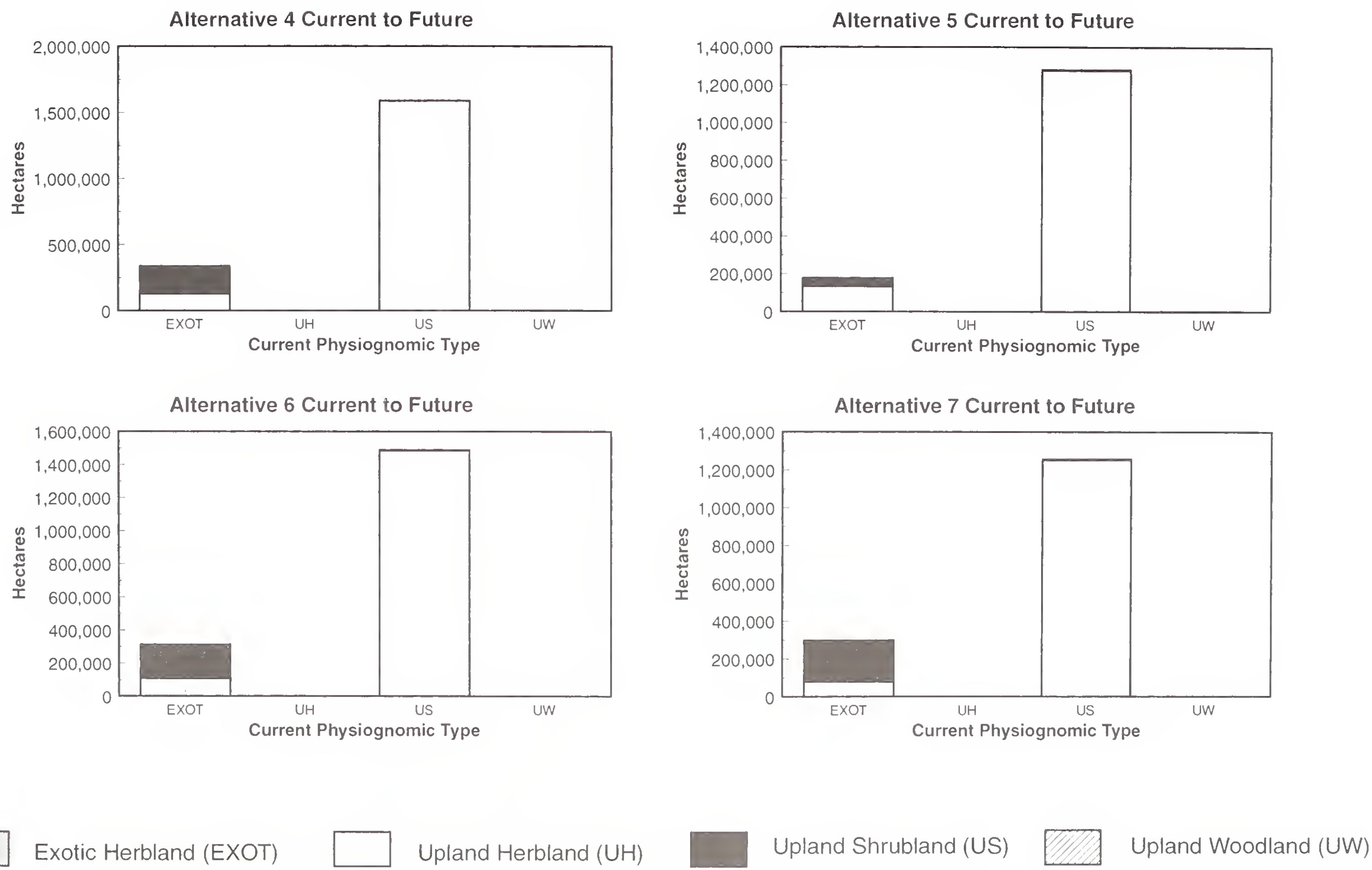
Transitions to Other Physiognomic Types -- Dry Shrub

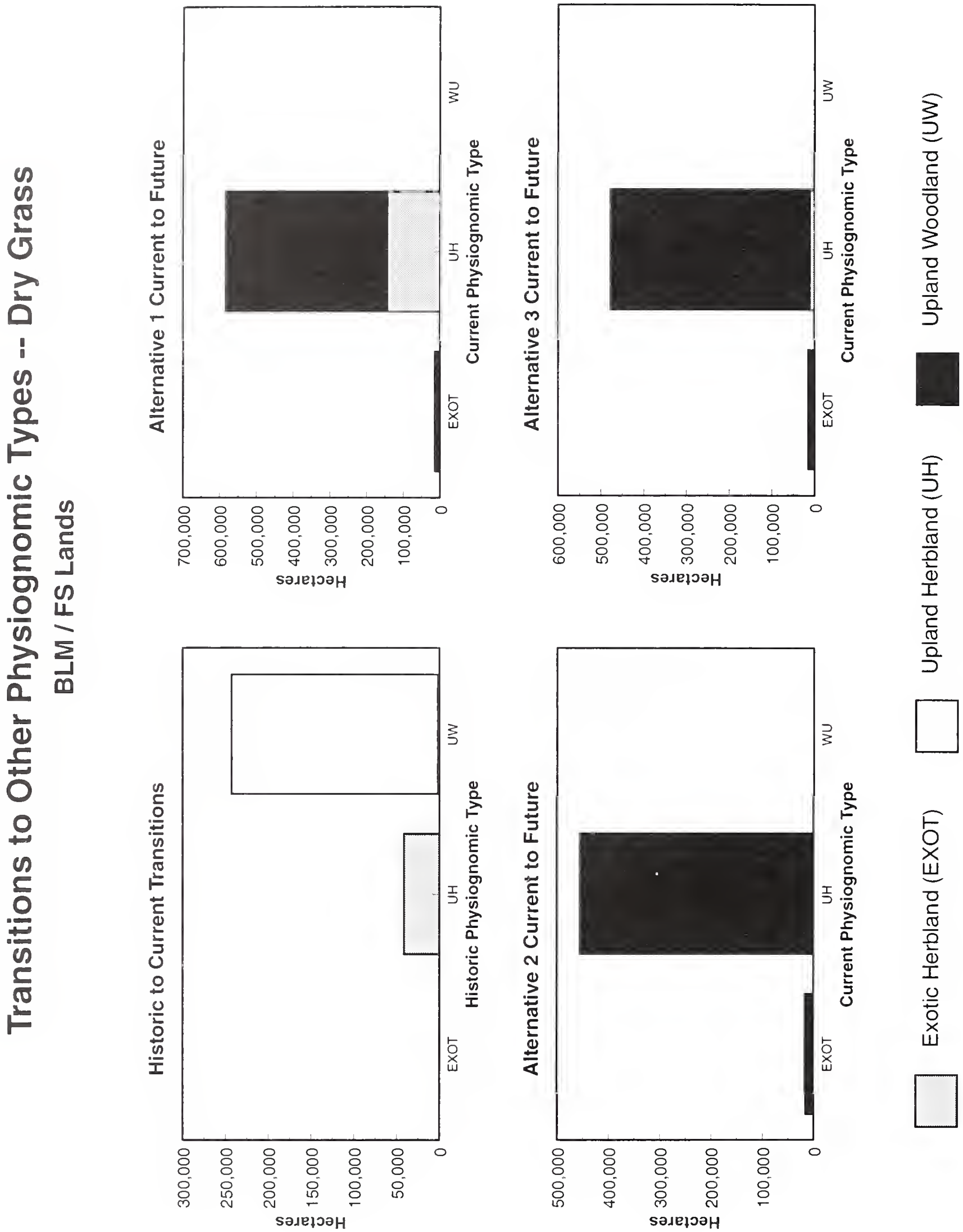
BLM / FS Lands



Transitions to Other Physiognomic Types -- Dry Shrub

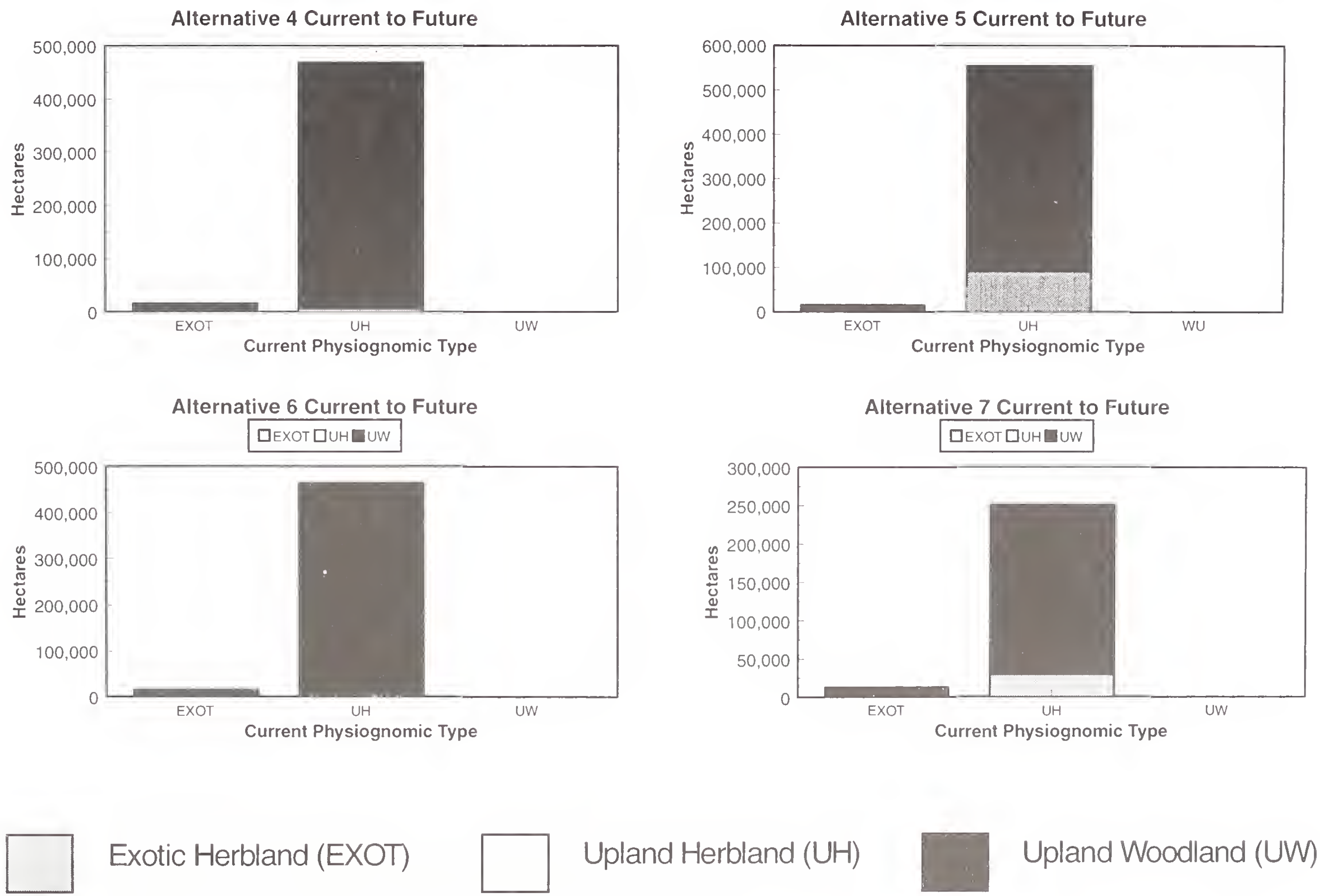
BLM / FS Lands




Transitions to Other Physiognomic Types -- Dry Grass
BLM / FS Lands
Historic to Current Transitions
Hectares
300,000
250,000
200,000
150,000
100,000
50,000
0
EXOT
UH
UW
Historic Physiognomic Type
Alternative 1 Current to Future
Hectares
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
EXOT
UH
UW
Current Physiognomic Type
Alternative 2 Current to Future
Hectares
500,000
400,000
300,000
200,000
100,000
0
EXOT
UH
UW
Current Physiognomic Type
Alternative 3 Current to Future
Hectares
600,000
500,000
400,000
300,000
200,000
100,000
0
EXOT
UH
UW
Current Physiognomic Type
Exotic Herbland (EXOT)
Upland Herbland (UH)
Upland Woodland (UW)

Transitions to Other Physiognomic Types -- Dry Grass

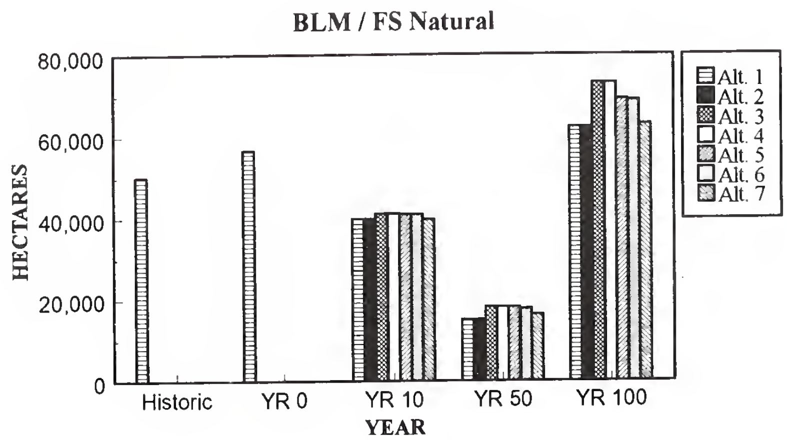
BLM / FS Lands

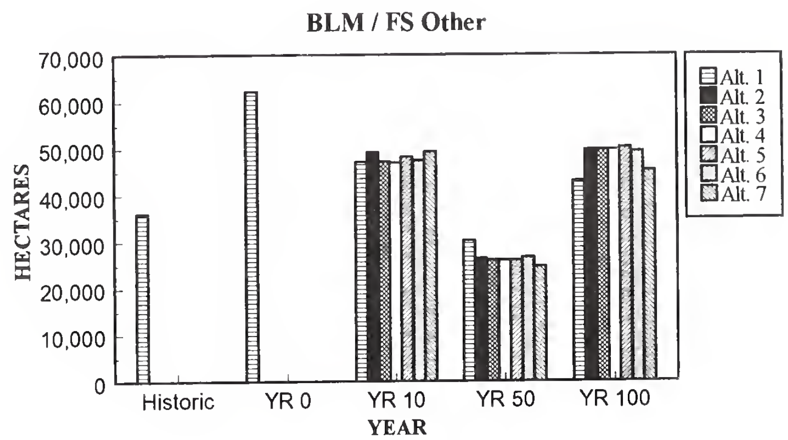


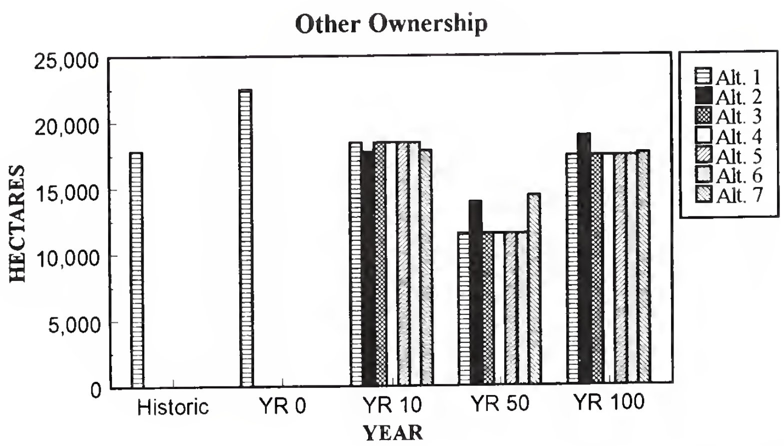
Appendix 2-K

Physiognomic type group trends by PVG for alternatives.

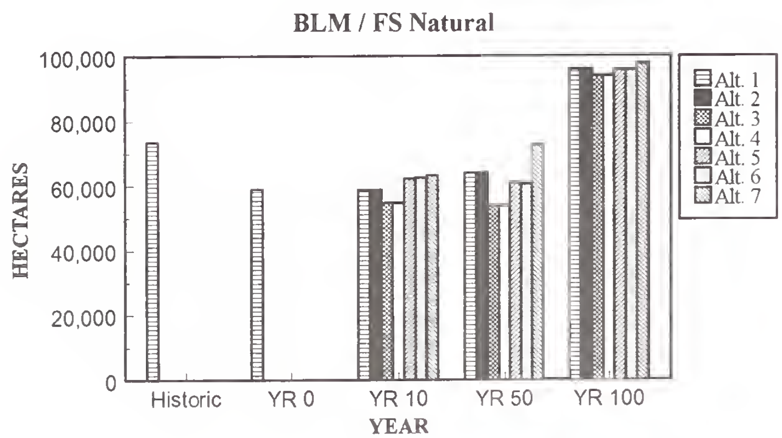
EASTSIDE E.I.S.
COLD FOREST / LATE-SERAL INTOLERANT MULTI-LAYER

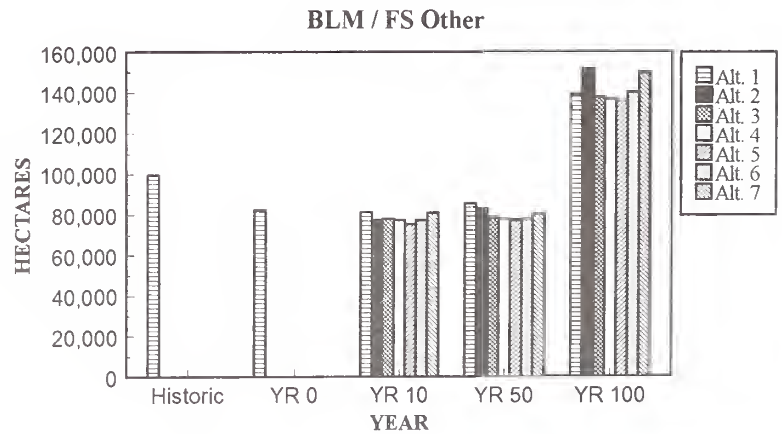


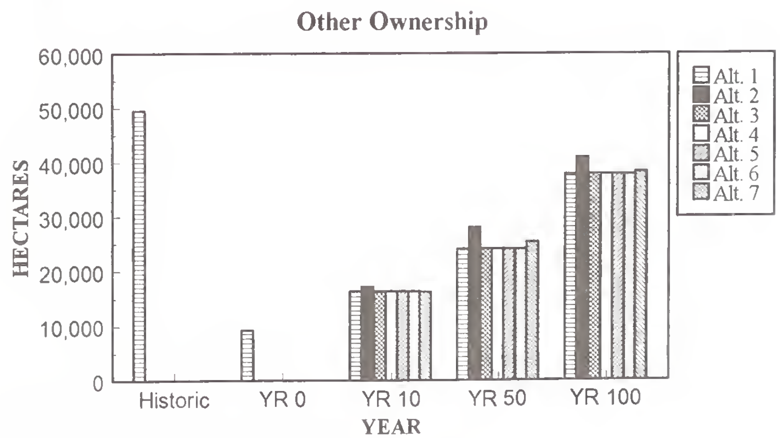




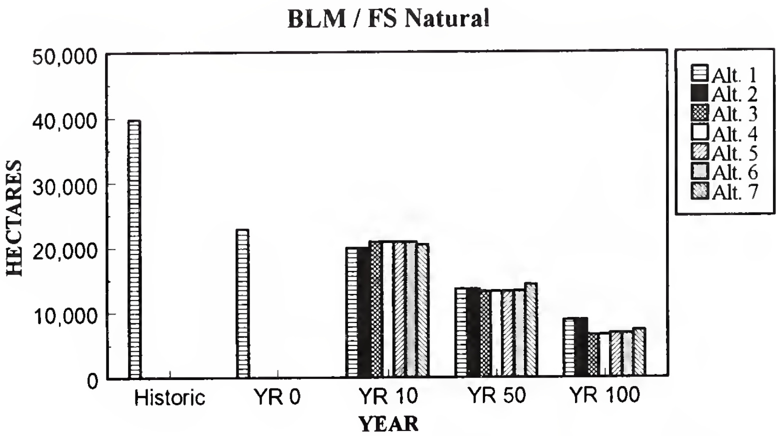
UPPER COLUMBIA RIVER BASIN
COLD FOREST / LATE-SERAL INTOLERANT MULTI-LAYER

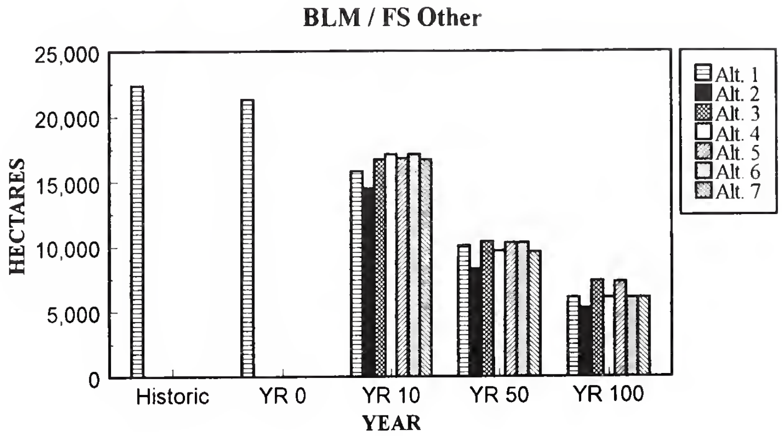


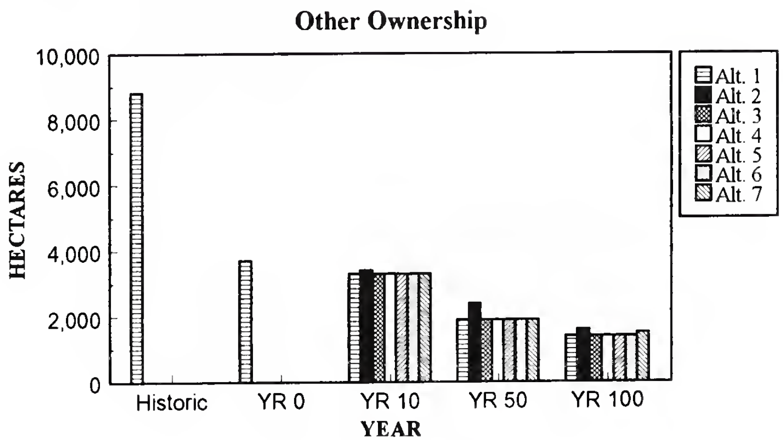




EASTSIDE E.I.S.
COLD FOREST / LATE-SERAL INTOLERANT SINGLE-LAYER

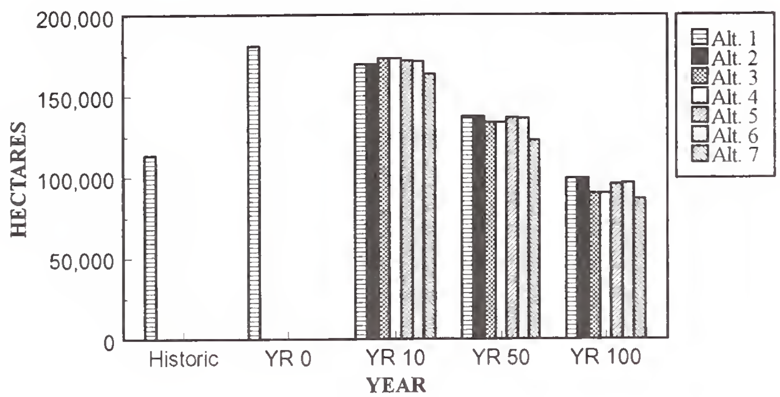




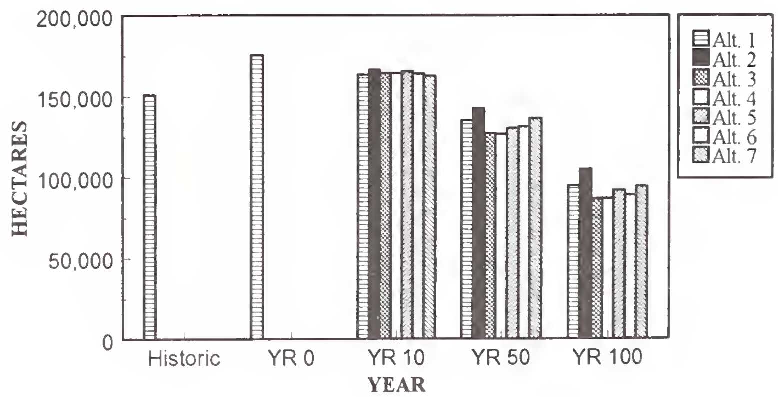


UPPER COLUMBIA RIVER BASIN
COLD FOREST / LATE-SERAL INTOLERANT SINGLE-LAYER

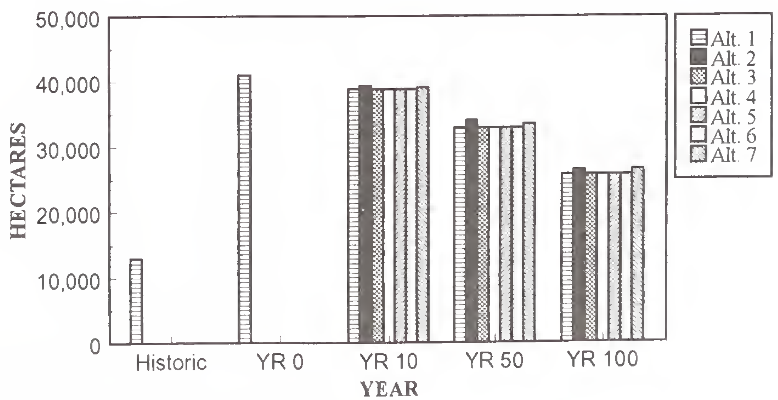
BLM / FS Natural



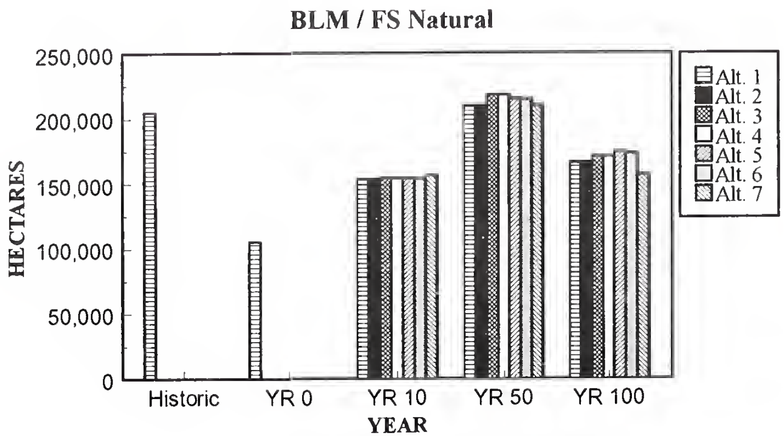
BLM / FS Other

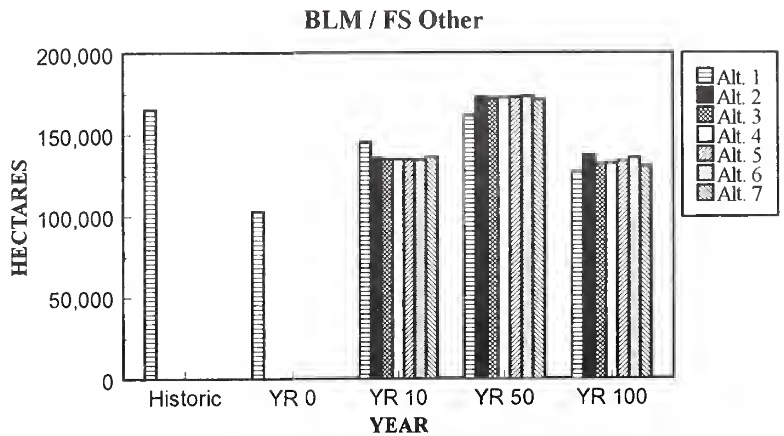


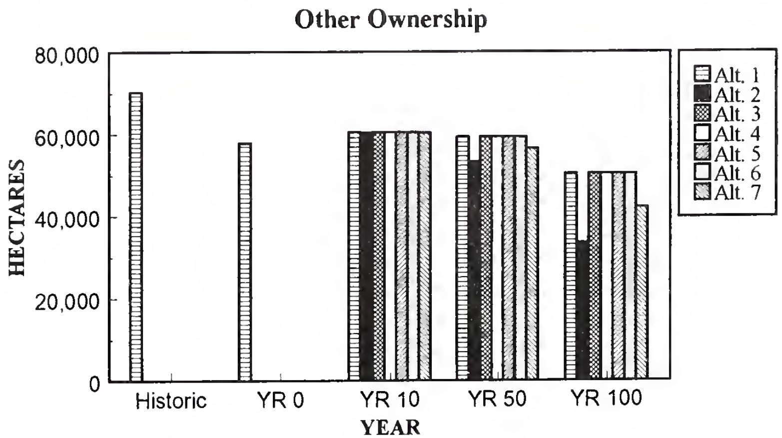
Other Ownership



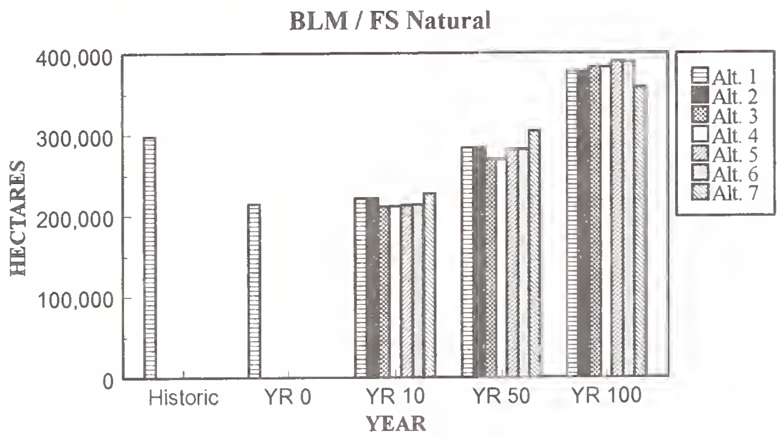
EASTSIDE E.I.S.
COLD FOREST / MID-SERAL INTOLERANT

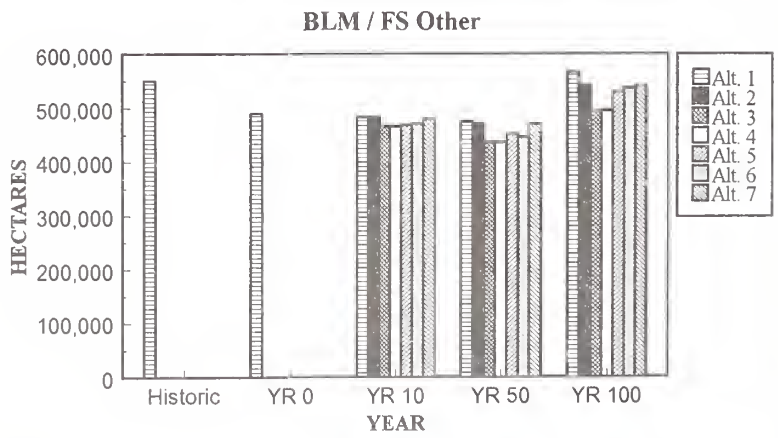


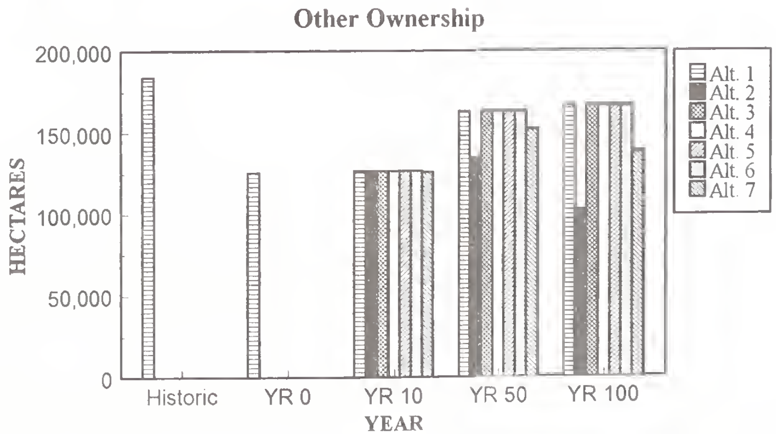




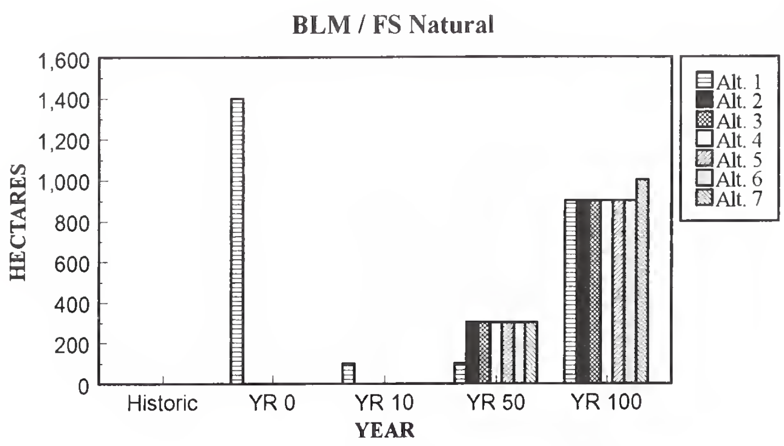
UPPER COLUMBIA RIVER BASIN
COLD FOREST / MID-SERAL INTOLERANT

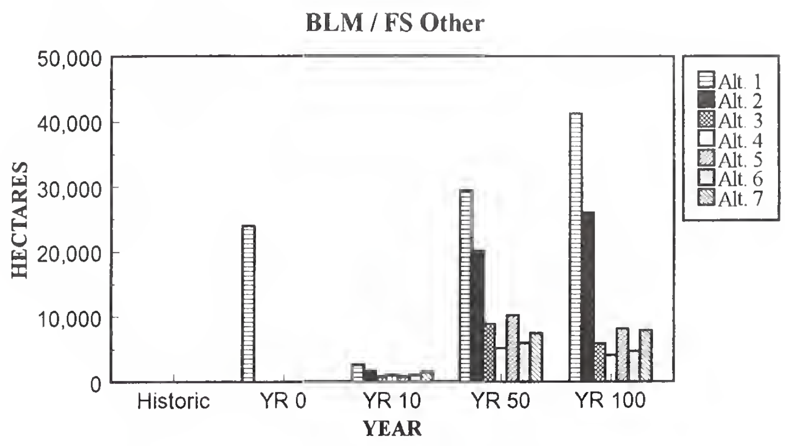


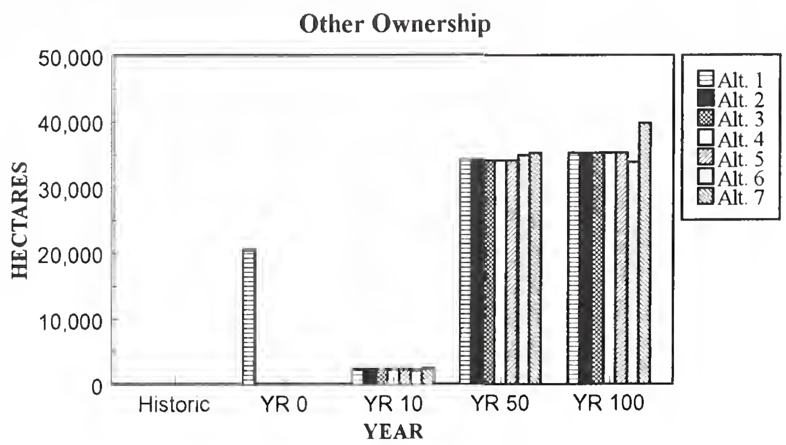




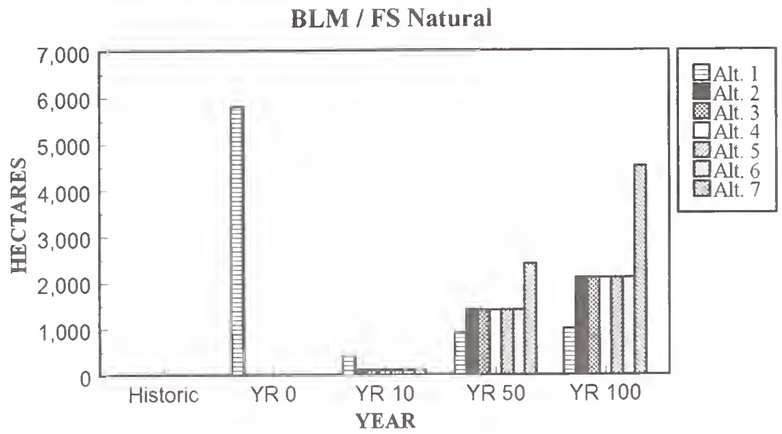
EASTSIDE E.I.S.
COOL SHRUB / EXOTICS

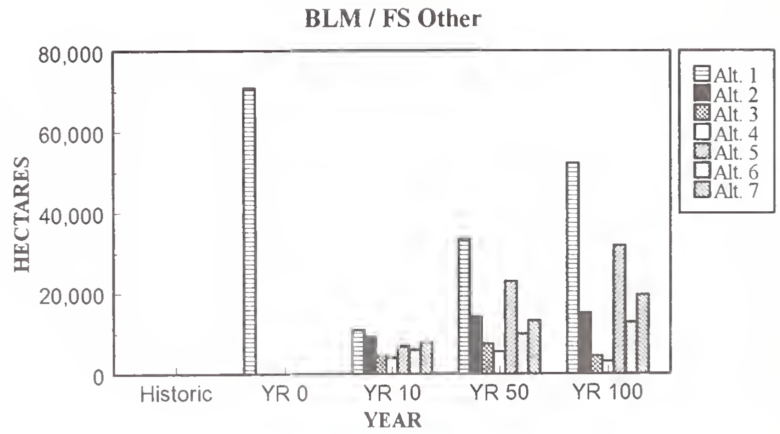


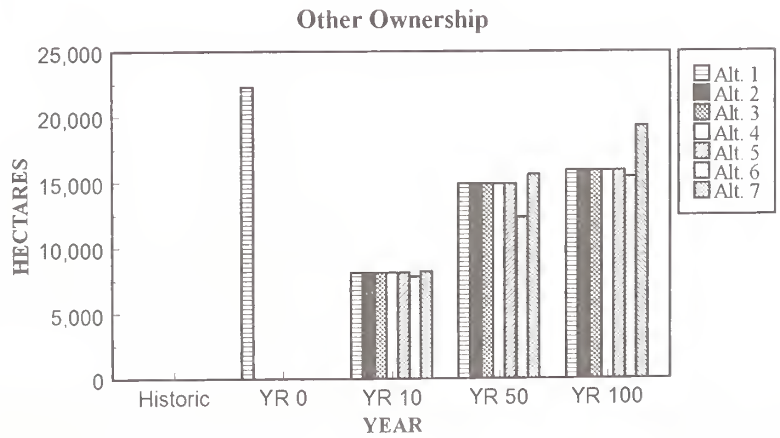




UPPER COLUMBIA RIVER BASIN
COOL SHRUB / EXOTICS

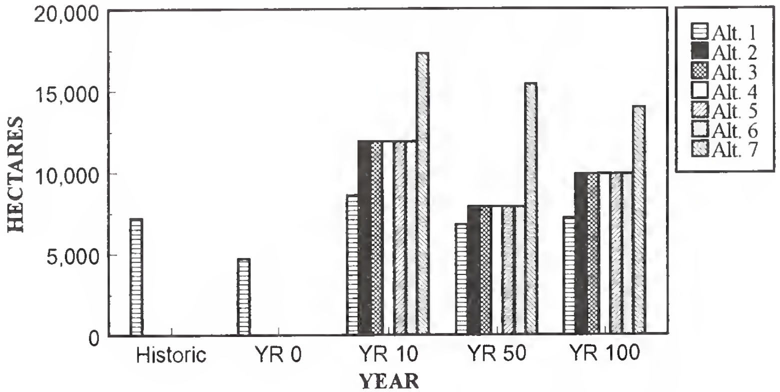




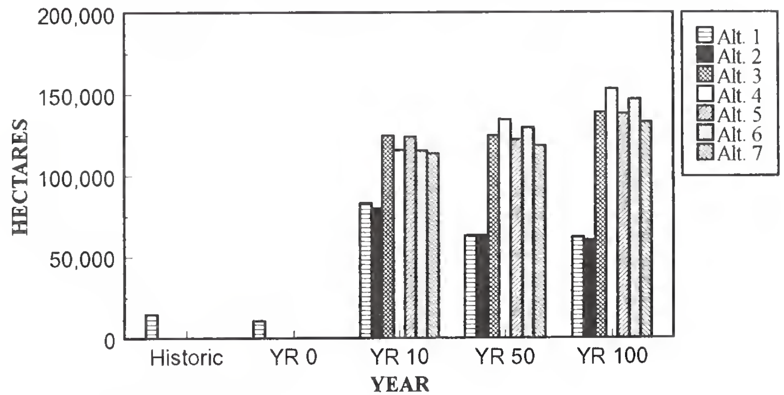


EASTSIDE E. I. S.
COOL SHRUB / UPLAND HERBLAND

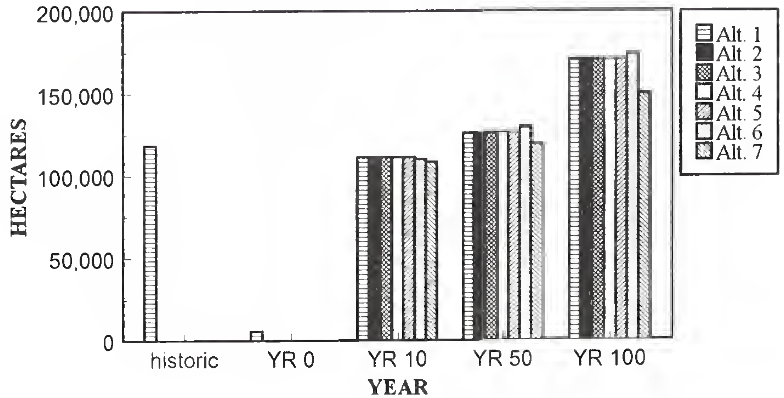
BLM / FS Natural



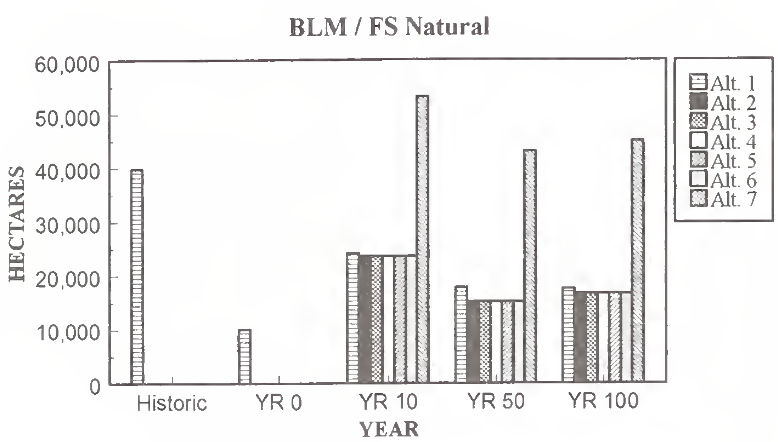
BLM / FS Other

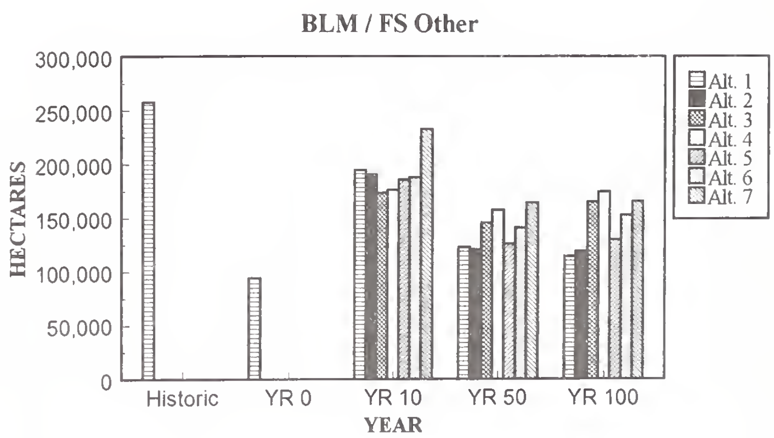


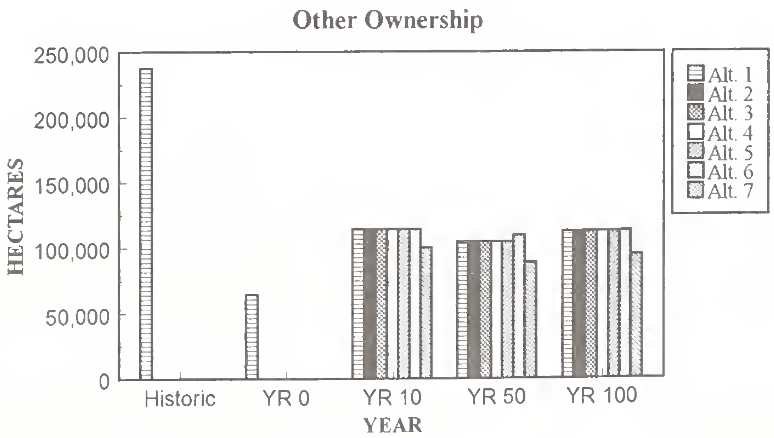
Other Ownership



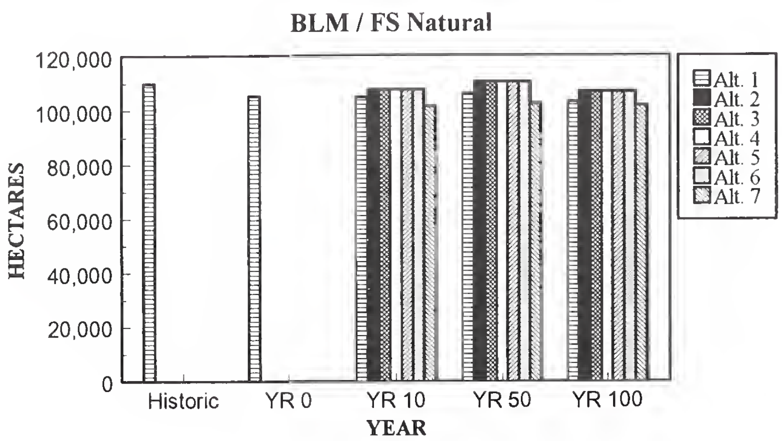
UPPER COLUMBIA RIVER BASIN
COOL SHRUB / UPLAND HERBLAND

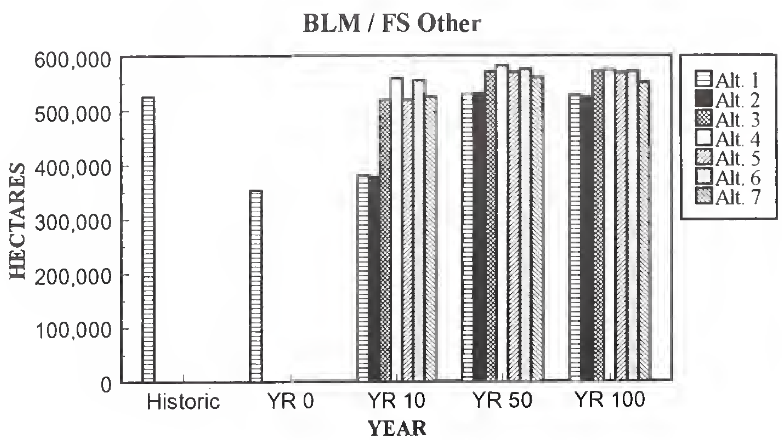


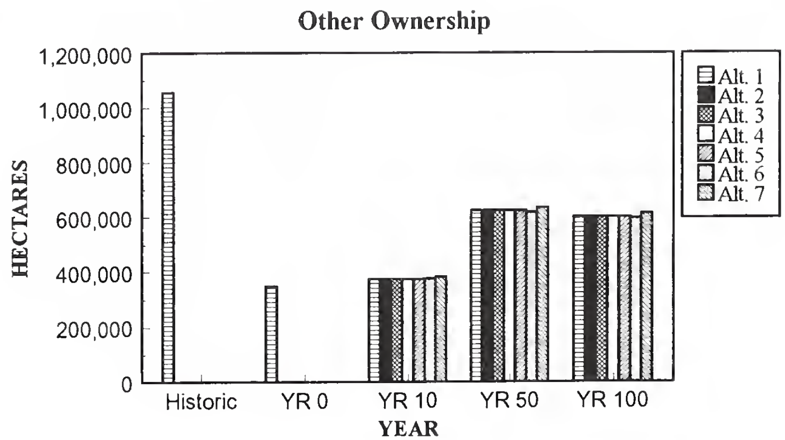




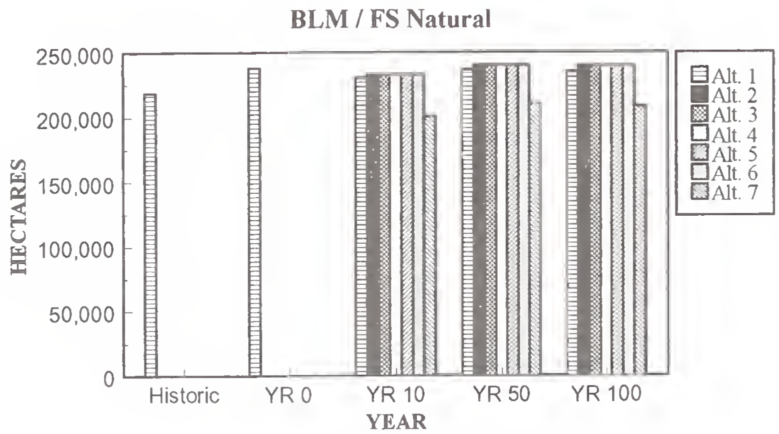
EASTSIDE E. I. S.
COOL SHRUB / UPLAND SHRUBLAND

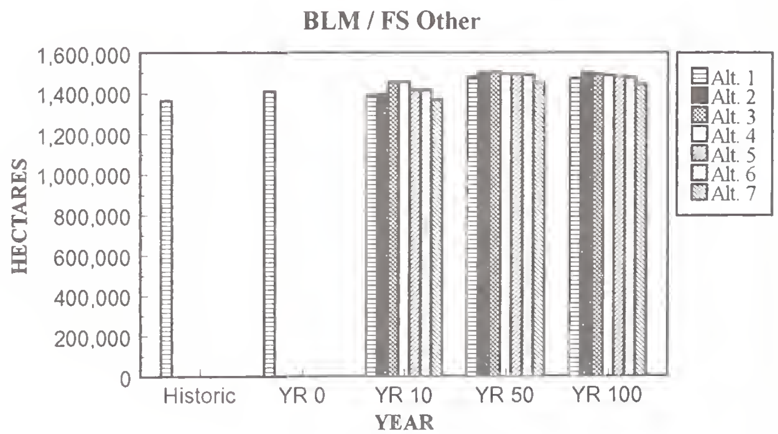


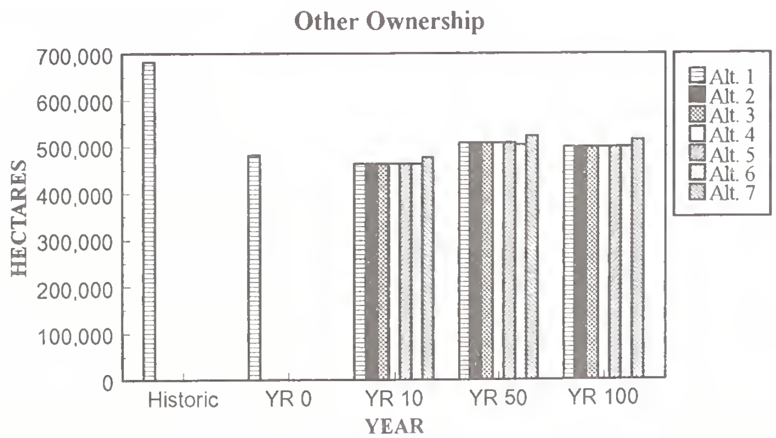




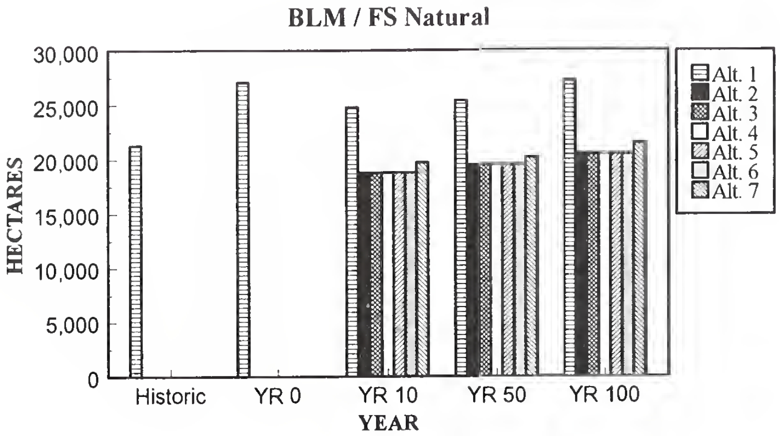
UPPER COLUMBIA RIVER BASIN
COOL SHRUB / UPLAND SHRUBLAND

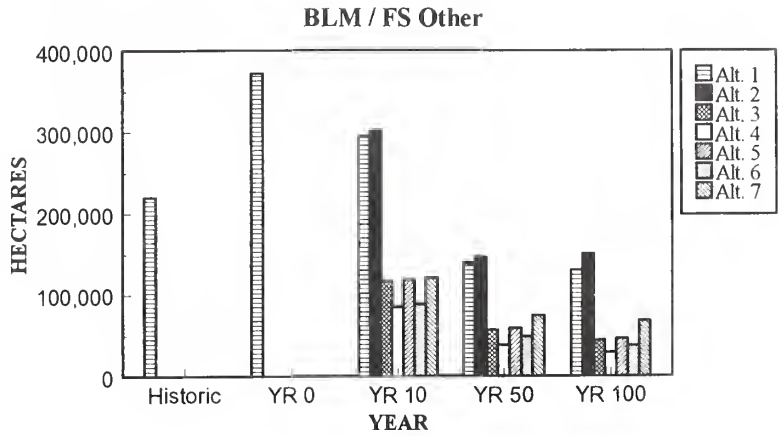


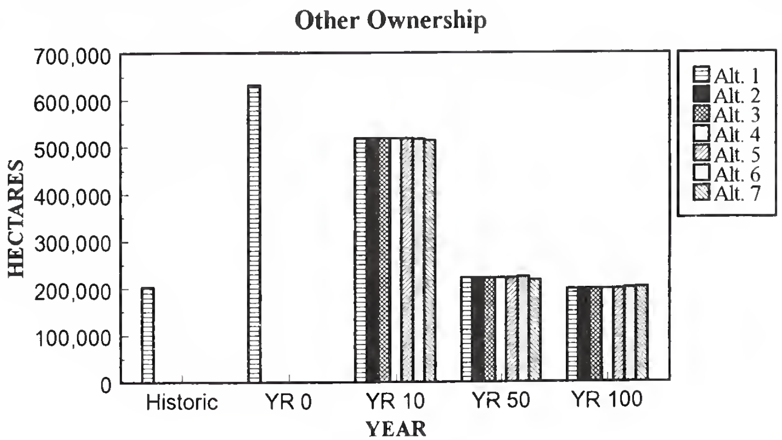




EASTSIDE E.I.S.
COOL SHRUB / UPLAND WOODLAND

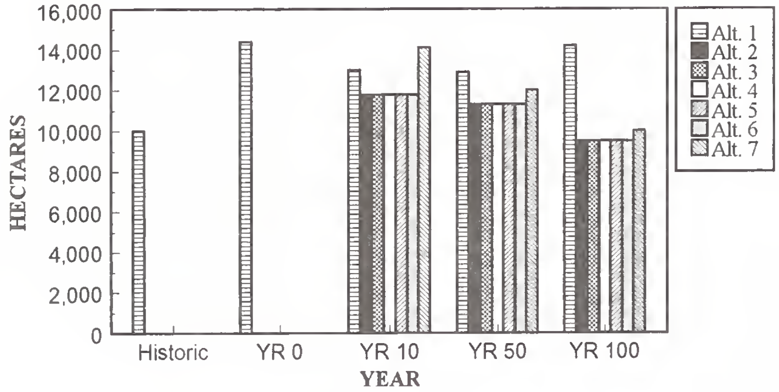




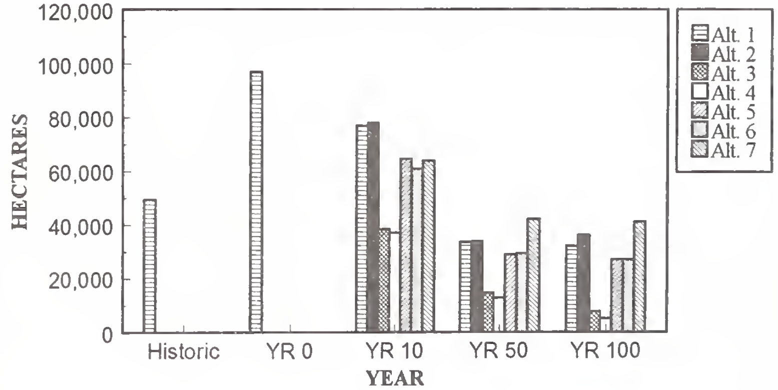


UPPER COLUMBIA RIVER BASIN
COOL SHRUB / UPLAND WOODLAND

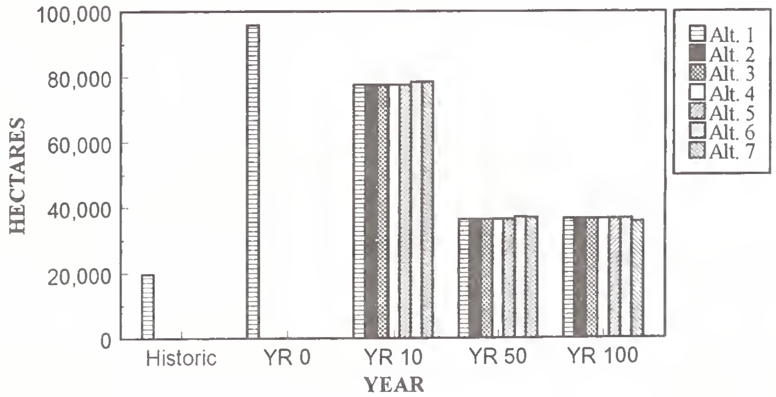
BLM / FS Natural



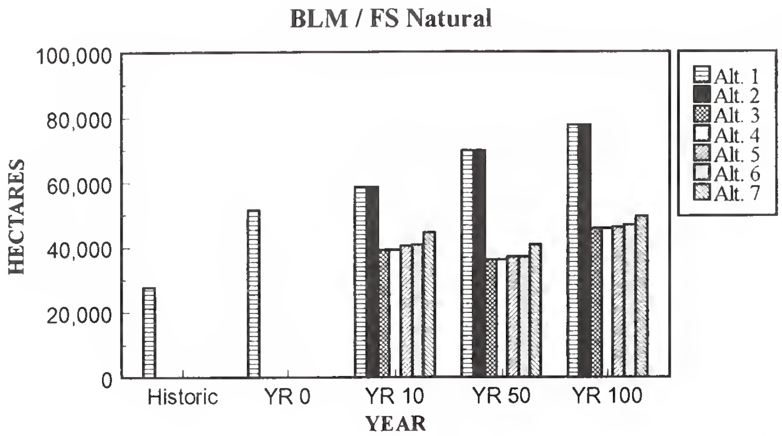
BLM / FS Other

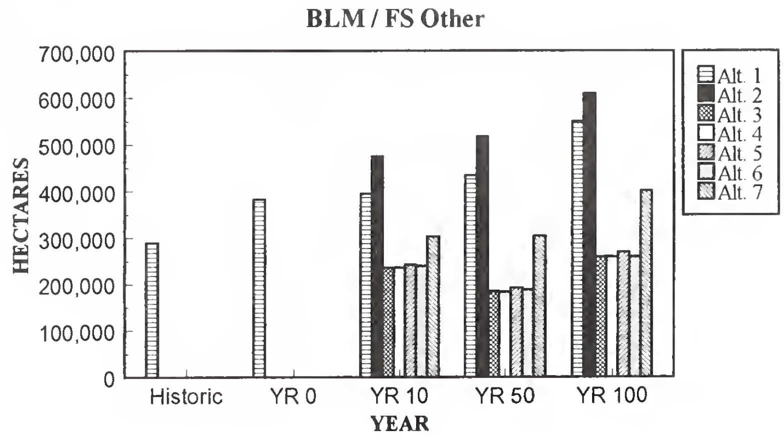


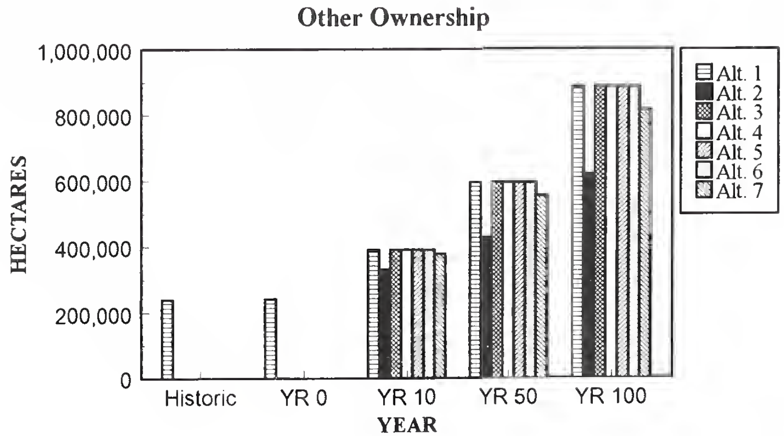
Other Ownership



EASTSIDE E.I.S.
DRY FOREST / LATE-SERAL INTOLERANT MULTI-LAYER

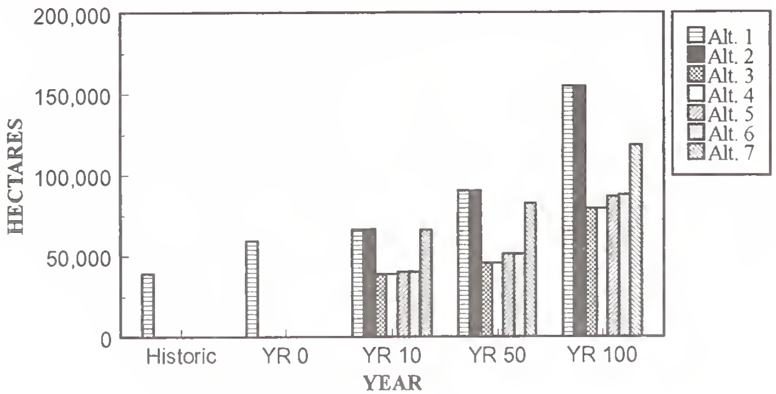




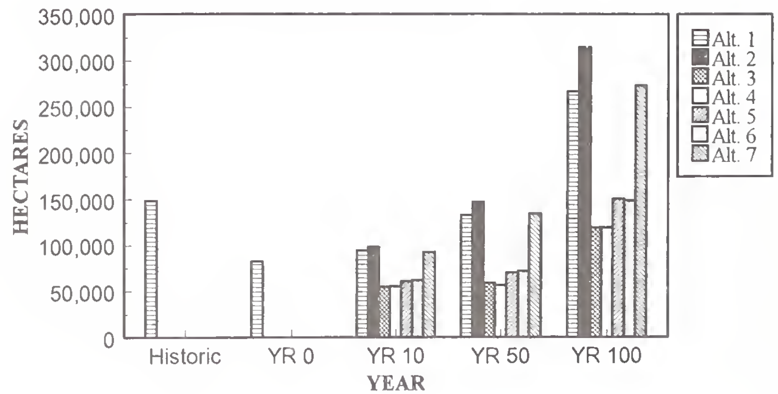


UPPER COLUMBIA RIVER BASIN
DRY FOREST / LATE-SERAL INTOLERANT MULTI-LAYER

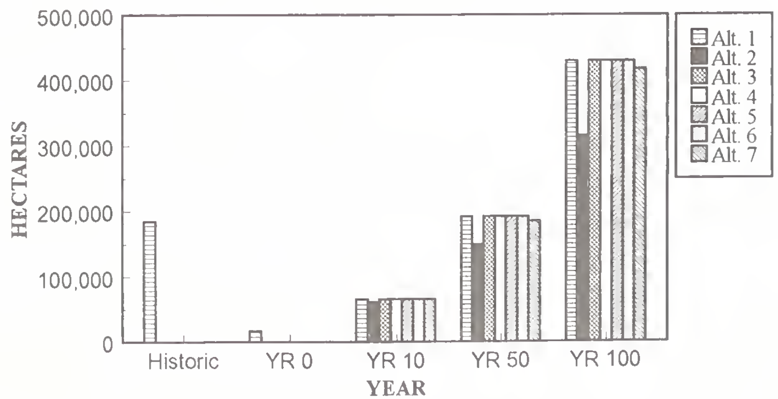
BLM / FS Natural



BLM / FS Other

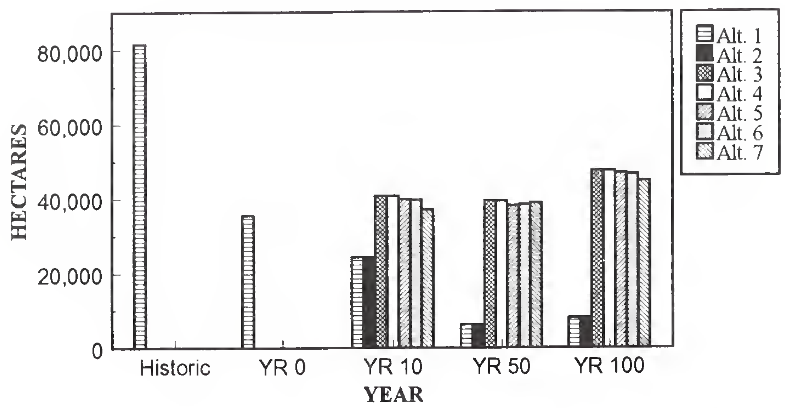


Other Ownership

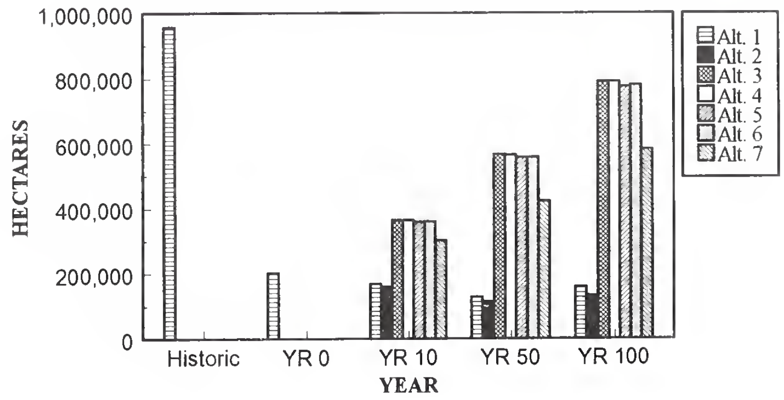


EASTSIDE E. I. S.
DRY FOREST / LATE-SERAL INTOLERANT SINGLE-LAYER

BLM / FS Natural



BLM / FS Other



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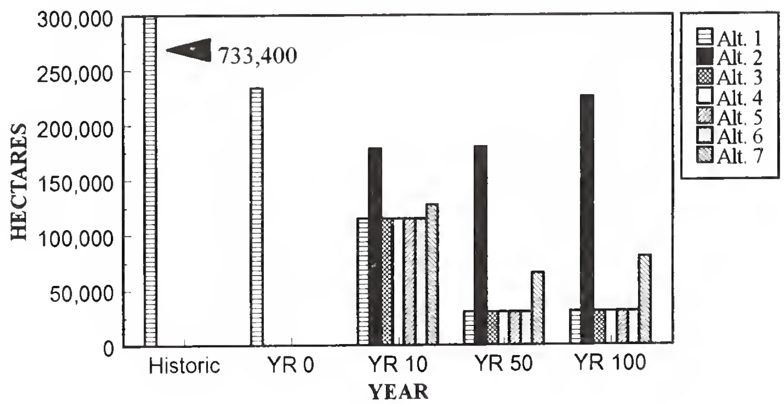
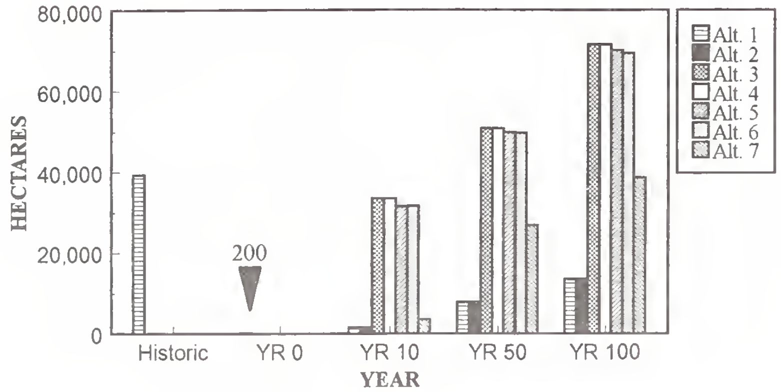
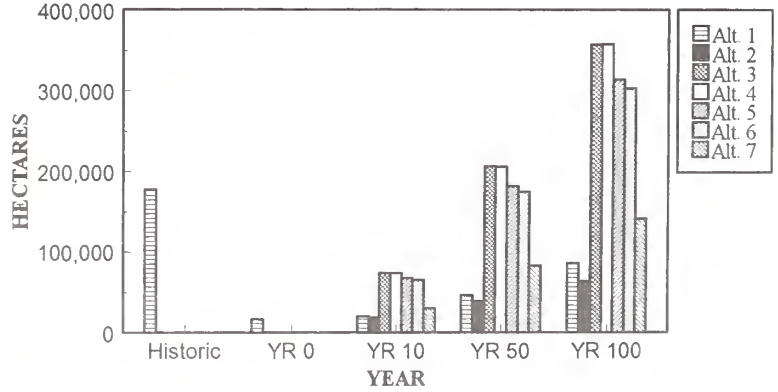


UPPER COLUMBIA RIVER BASIN
DRY FOREST / LATE-SERAL INTOLERANT SINGLE-LAYER

BLM / FS Natural



BLM / FS Other



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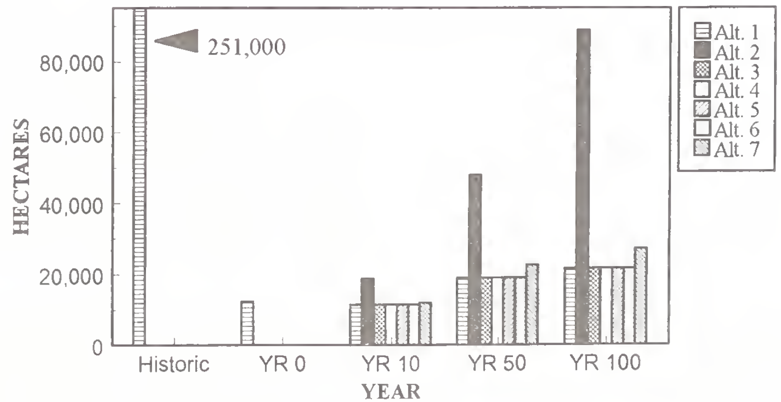
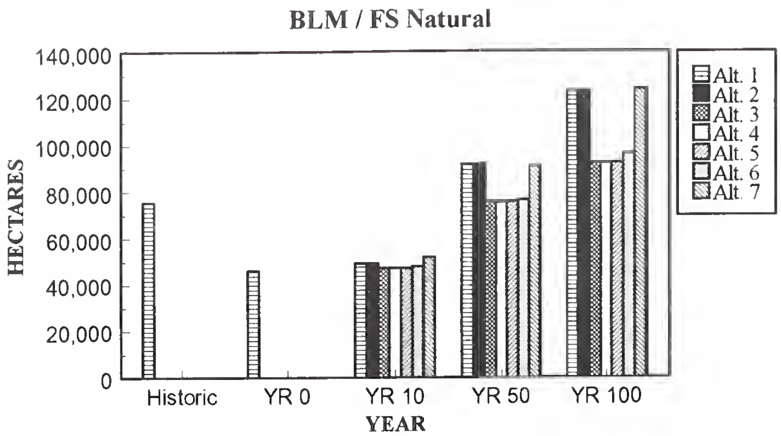
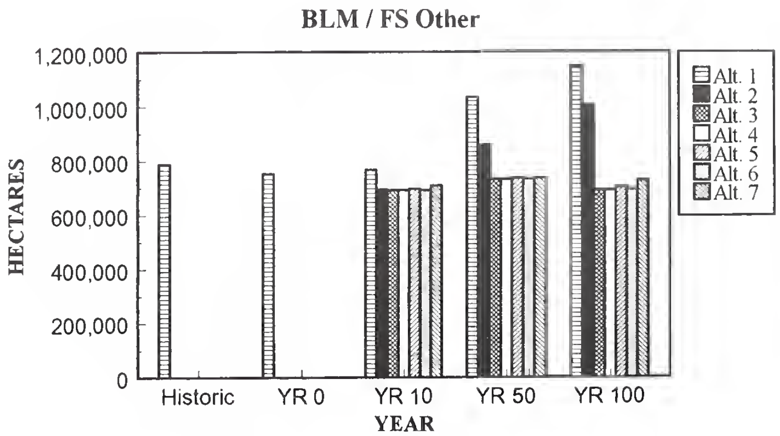
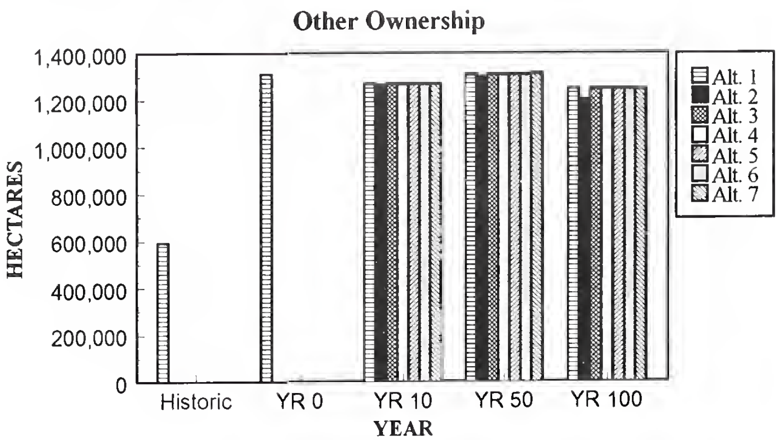


EASTSIDE E.I.S.
DRY FOREST / MID-SERAL INTOLERANT

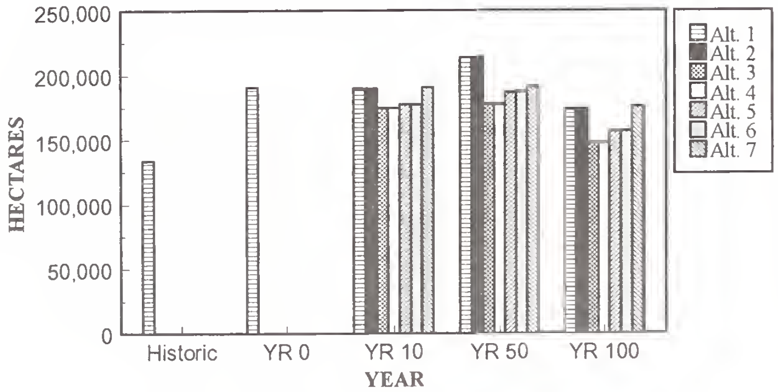




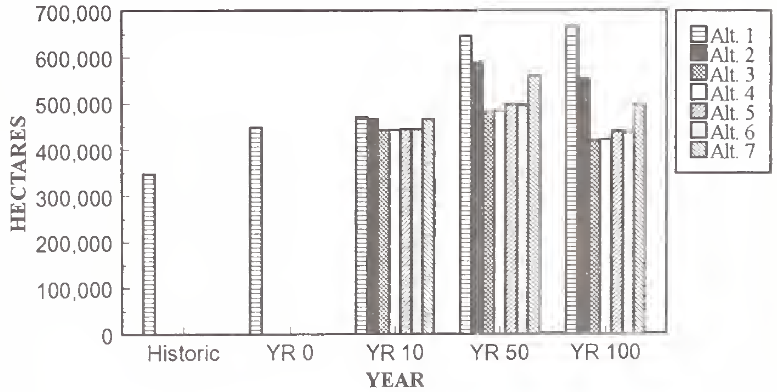


UPPER COLUMBIA RIVER BASIN
DRY FOREST / MID-SERAL INTOLERANT

BLM / FS Natural



BLM / FS Other



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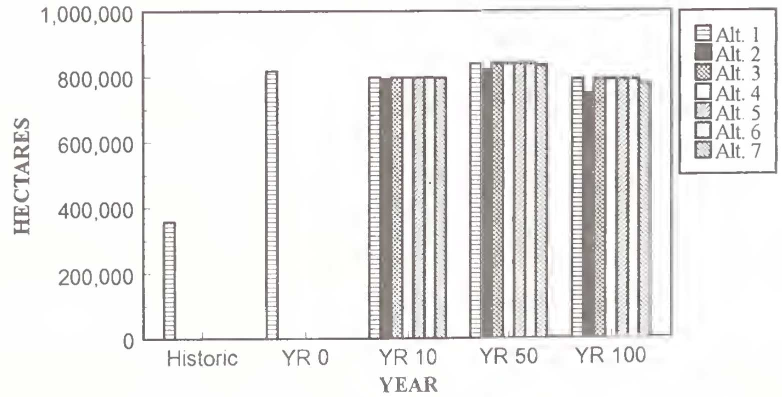
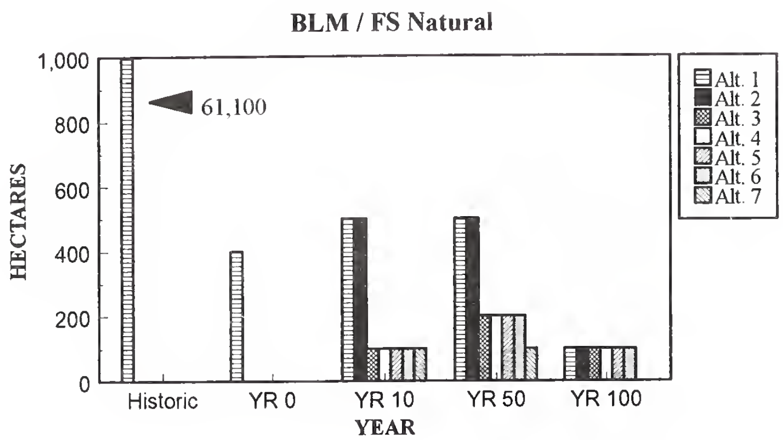
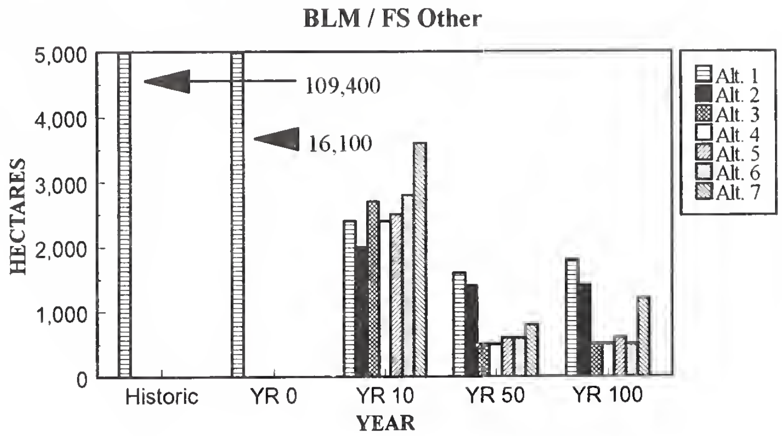
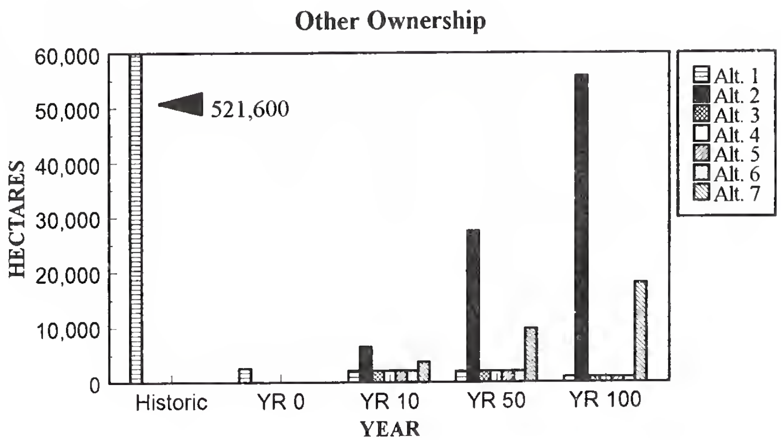


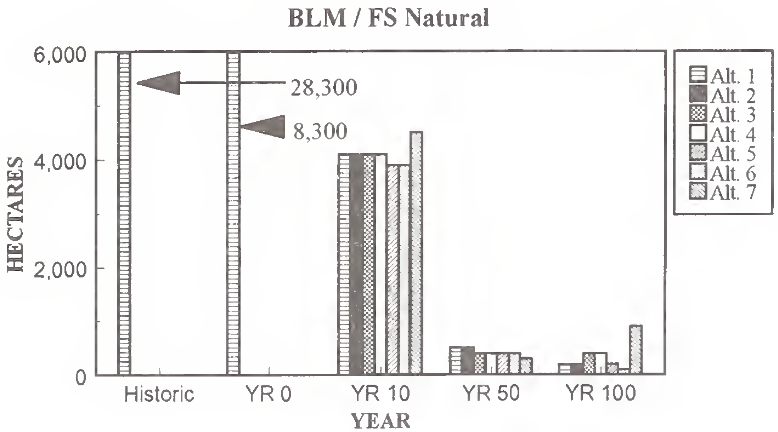
EASTSIDE E.I.S.
DRY FOREST / UPLAND HERBLAND

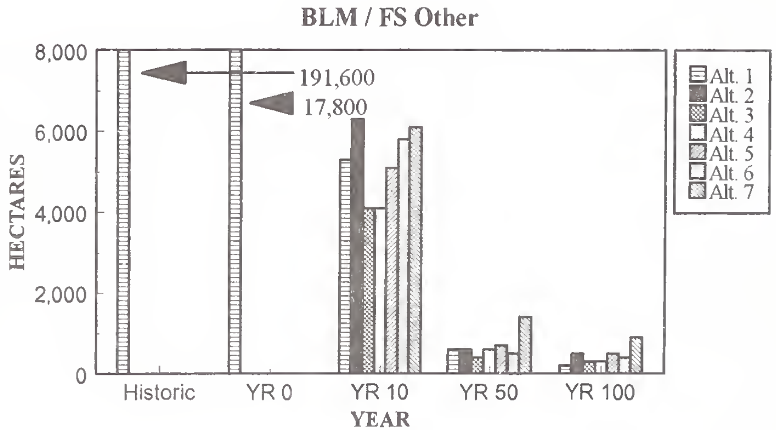


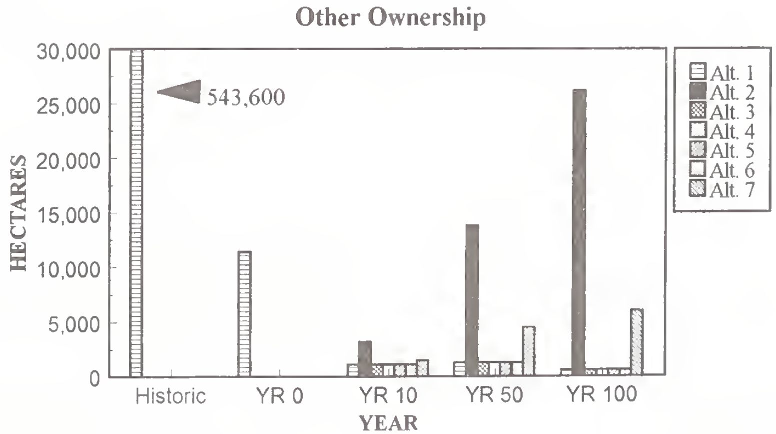




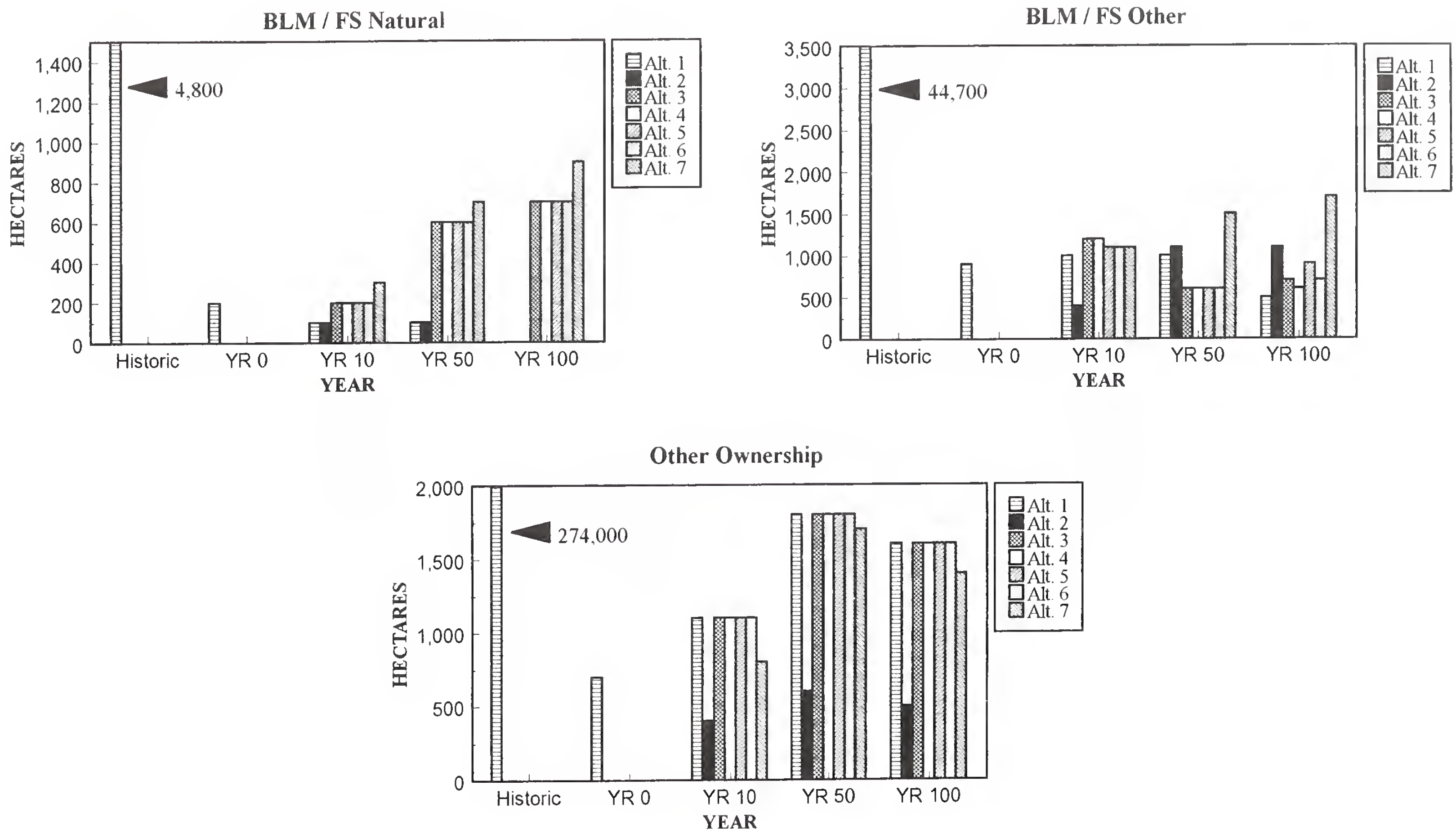
UPPER COLUMBIA RIVER BASIN
DRY FOREST / UPLAND HERBLAND





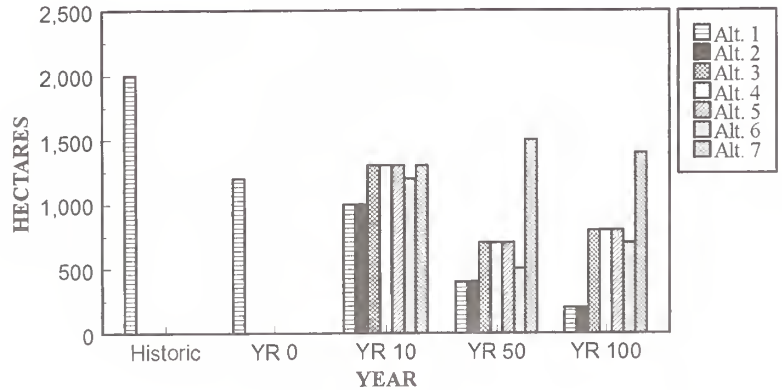


EASTSIDE E.I.S.
DRY FOREST / UPLAND SHRUBLAND

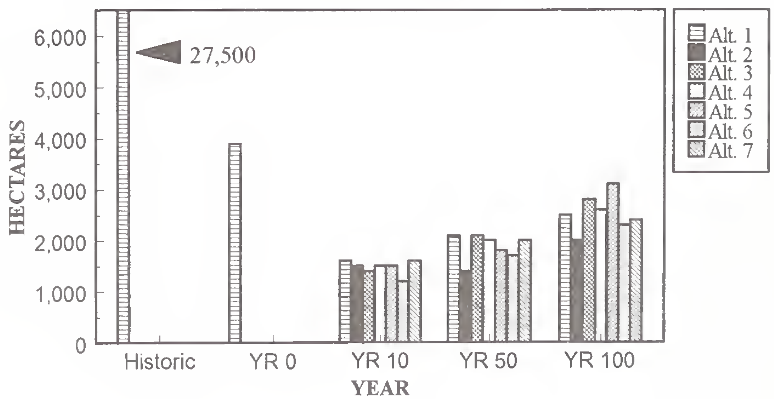


UPPER COLUMBIA RIVER BASIN
DRY FOREST / UPLAND SHRUBLAND

BLM / FS Natural



BLM / FS Other



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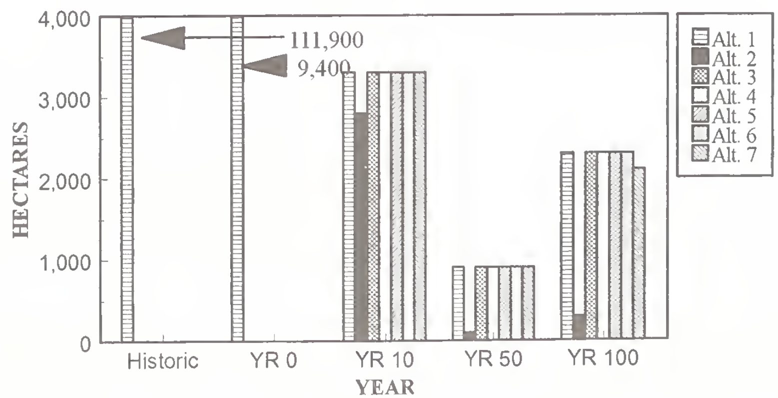
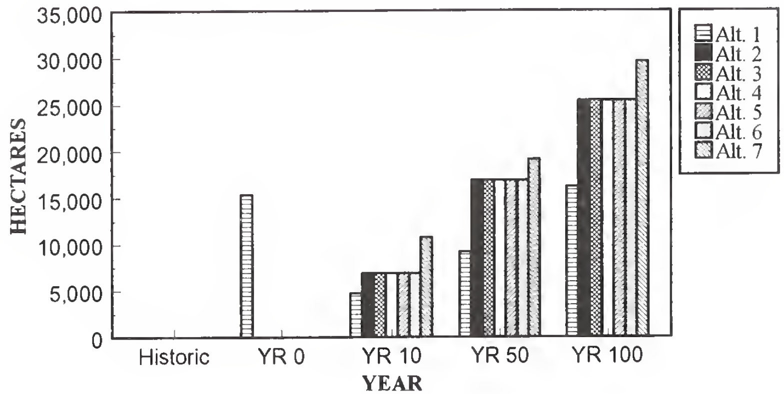
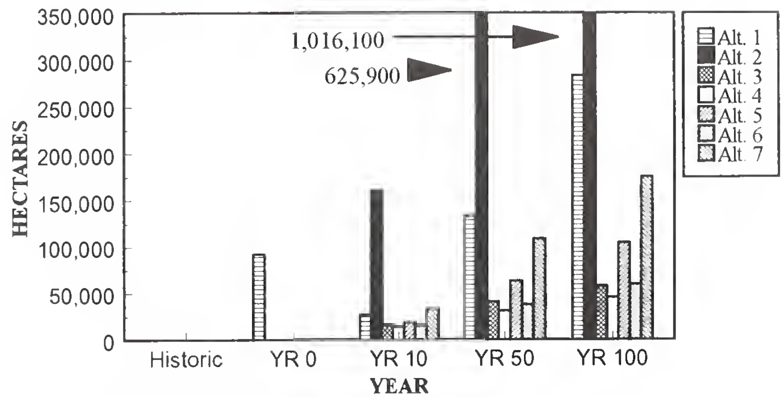


EASTSIDE E.I.S
DRY SHRUB / EXOTICS

BLM / FS Natural



BLM / FS Other



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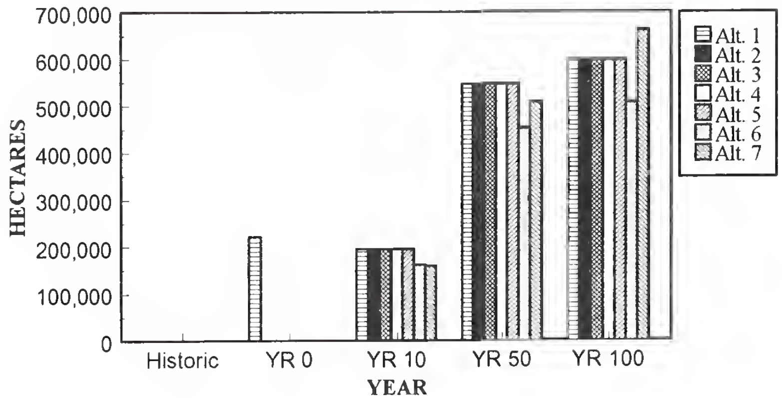
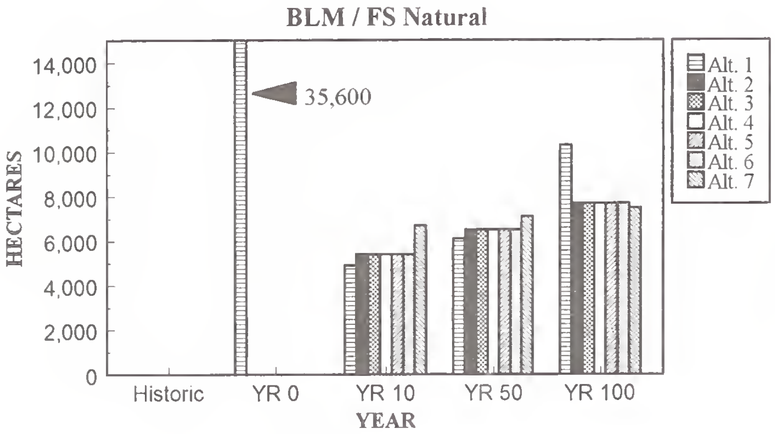
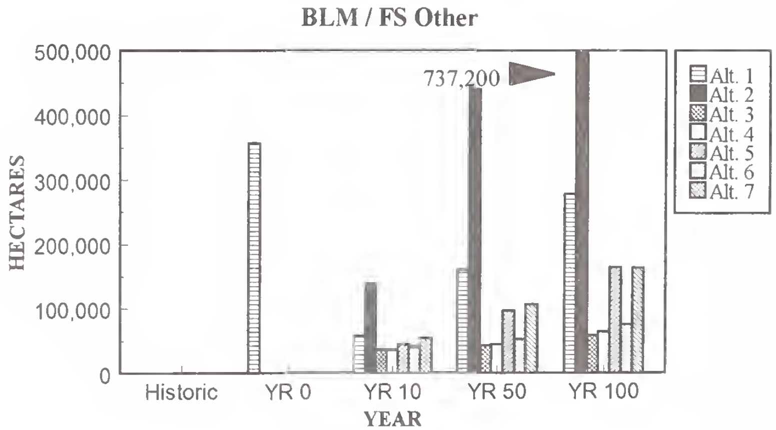
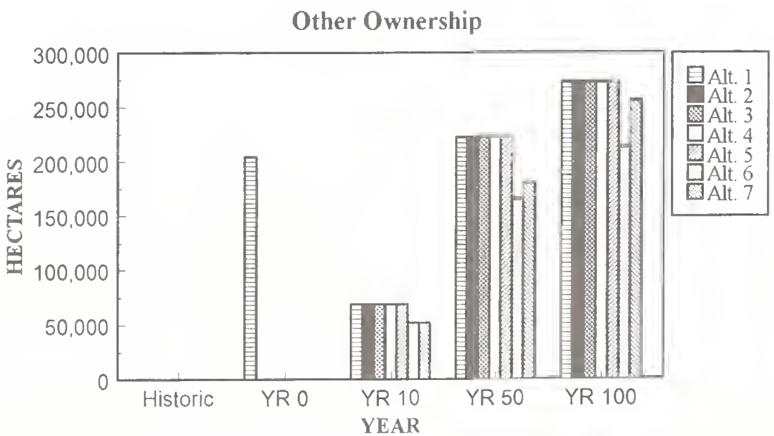


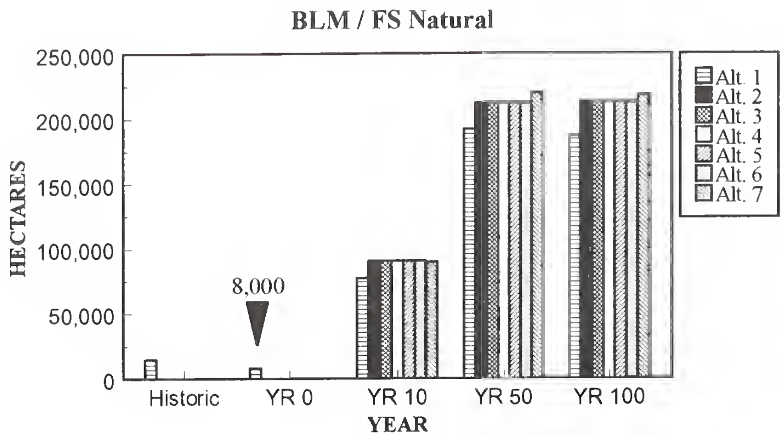
UPPER COLUMBIA RIVER BASIN
DRY SHRUB / EXOTICS

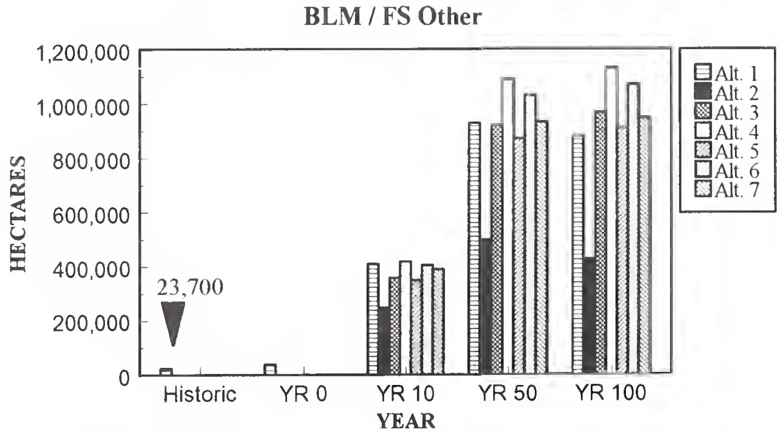


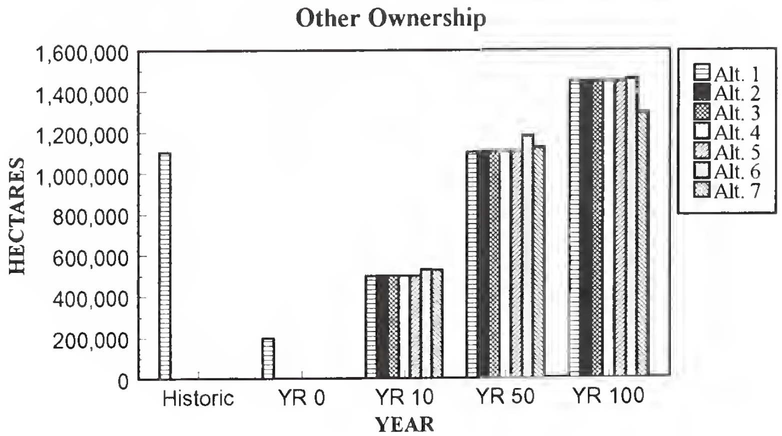




EASTSIDE E. I. S.
DRY SHRUB / UPLAND HERBLAND

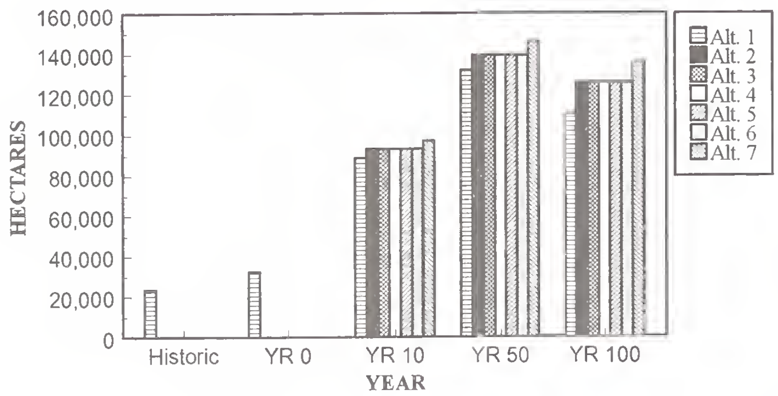




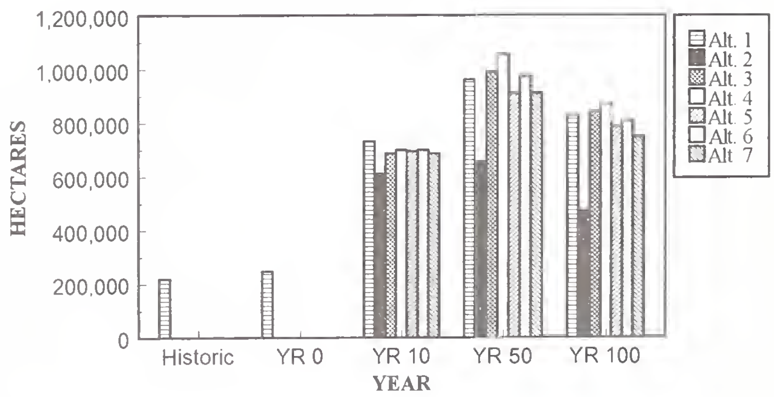


UPPER COLUMBIA RIVER BASIN
DRY SHRUB / UPLAND HERBLAND

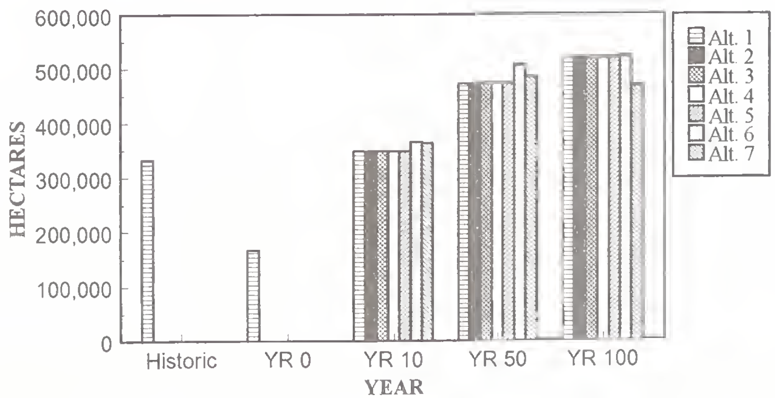
BLM / FS Natural



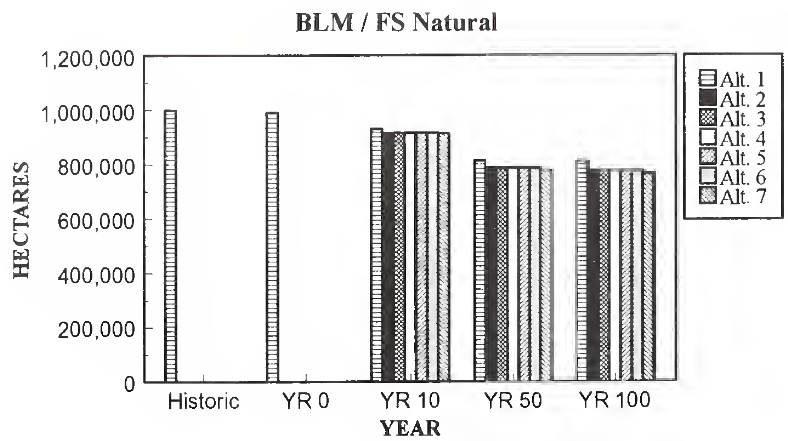
BLM / FS Other

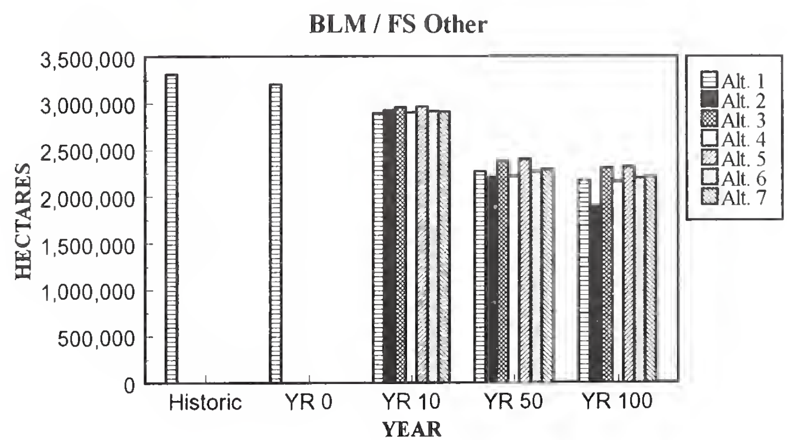


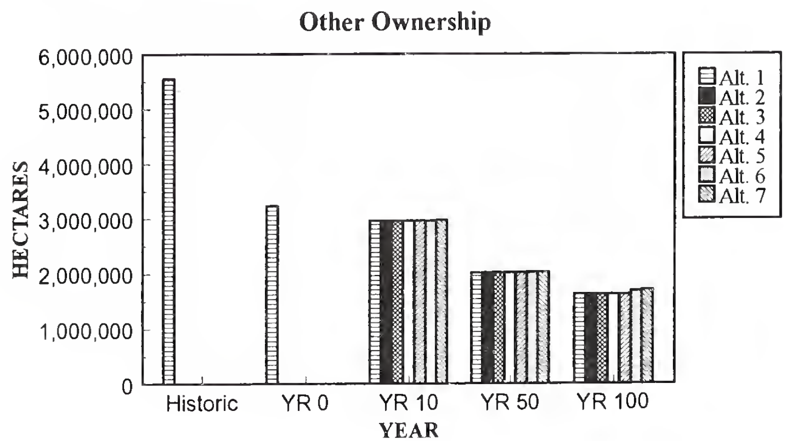
Other Ownership



EASTSIDE E. I. S.
DRY SHRUB / UPLAND SHRUBLAND

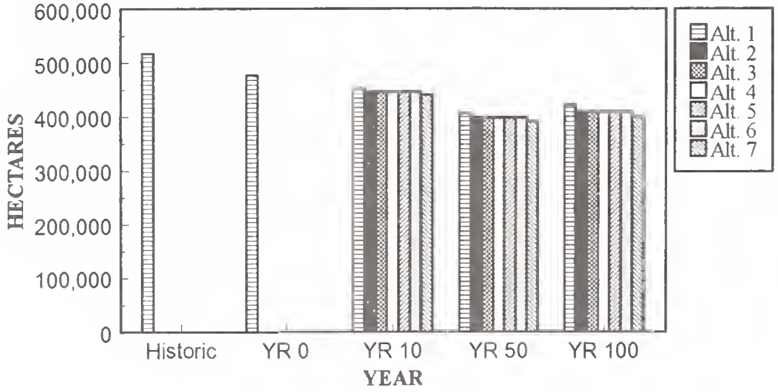




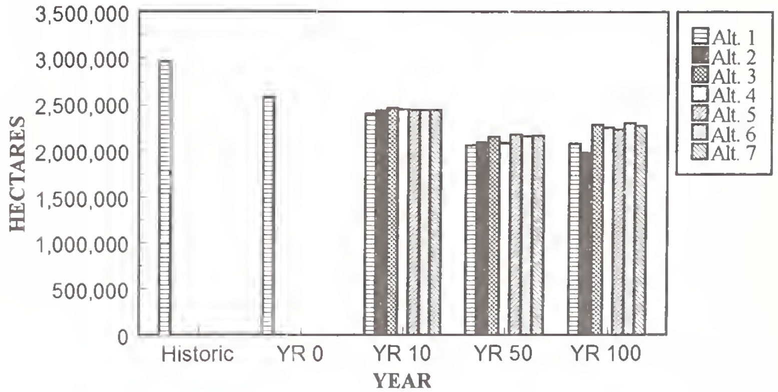


UPPER COLUMBIA RIVER BASIN
DRY SHRUB / UPLAND SHRUBLAND

BLM / FS Natural



BLM / FS Other



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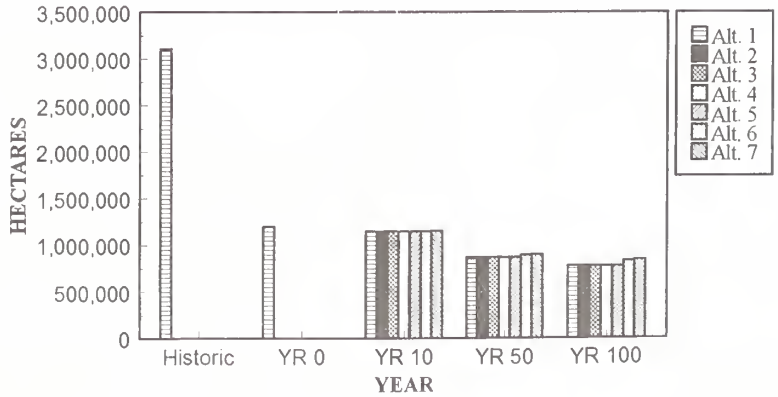
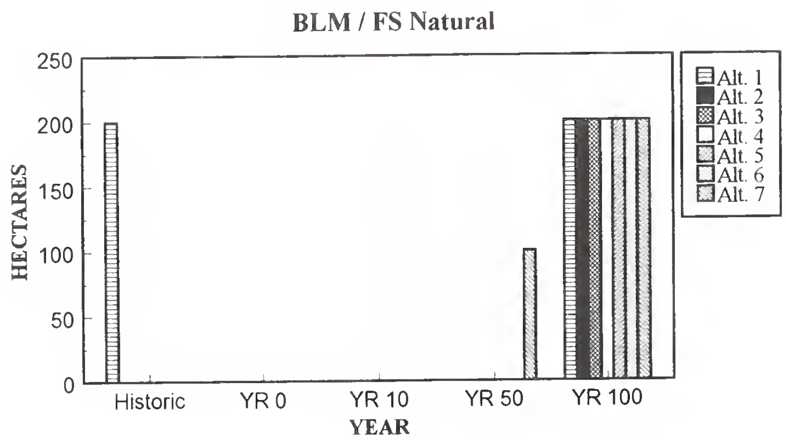
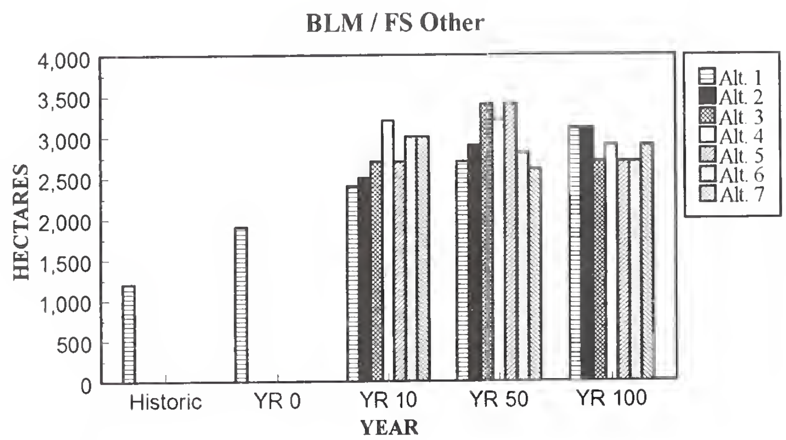
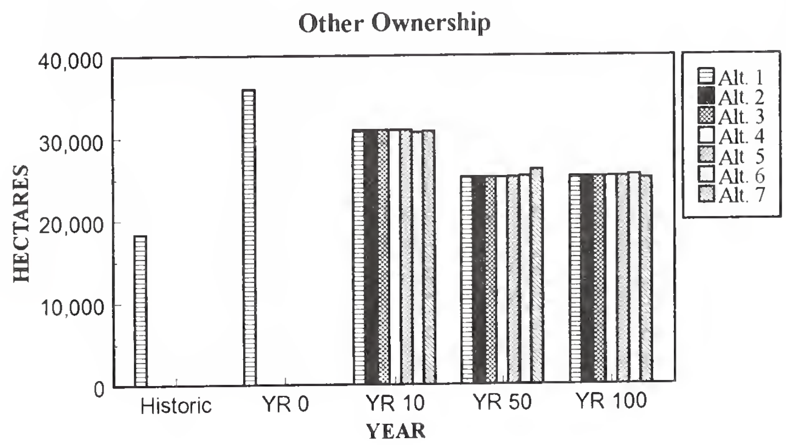


EASTSIDE E. I. S.
DRY SHRUB / UPLAND WOODLAND

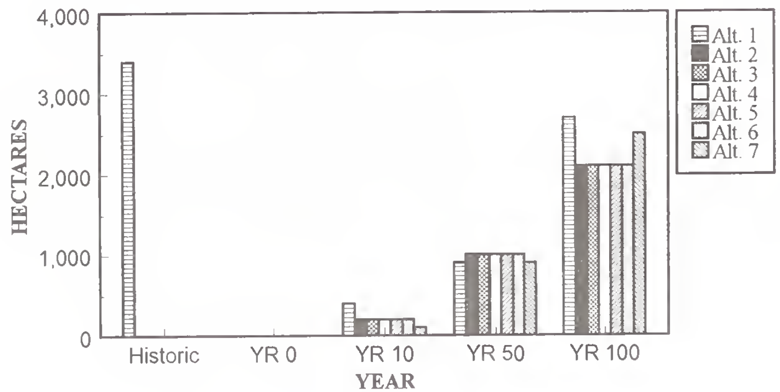




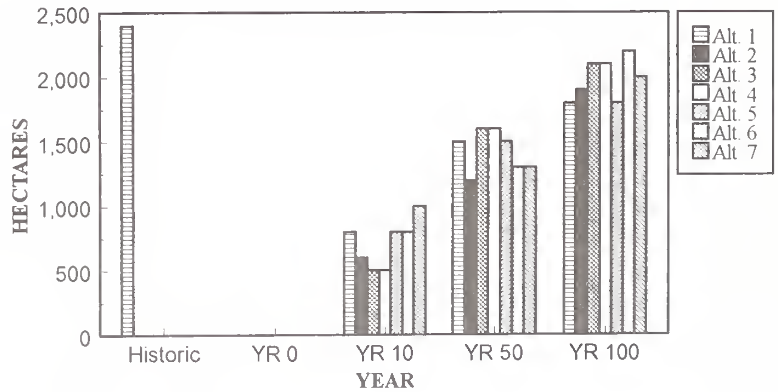


UPPER COLUMBIA RIVER BASIN
DRY SHRUB / UPLAND WOODLAND

BLM / FS Natural



BLM / FS Other



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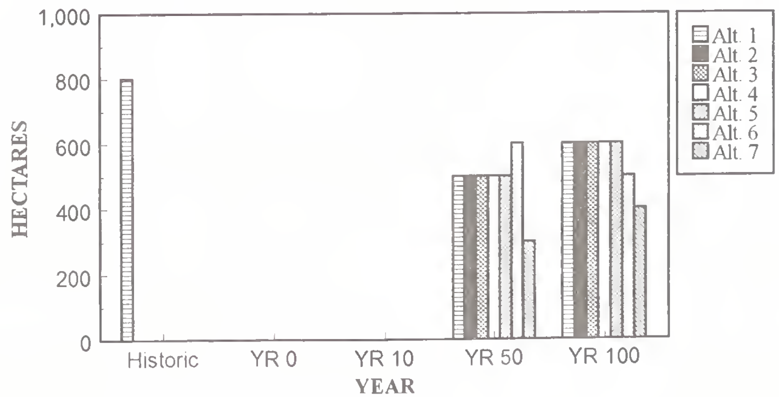
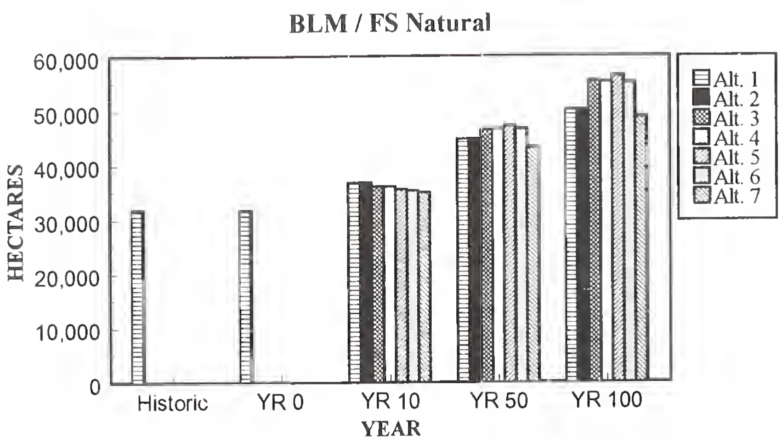
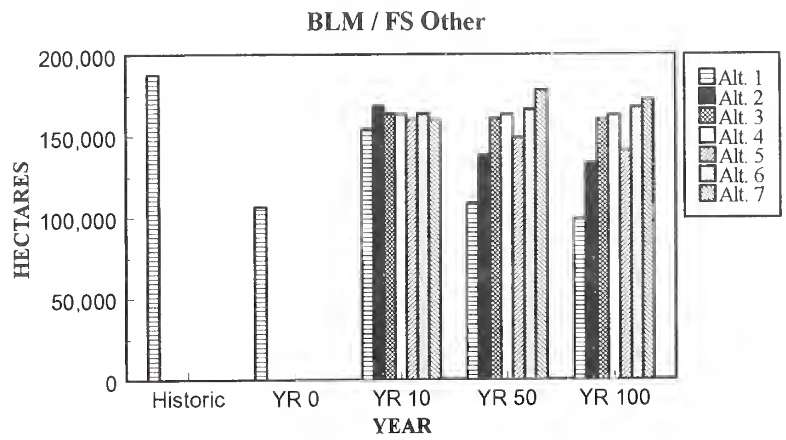
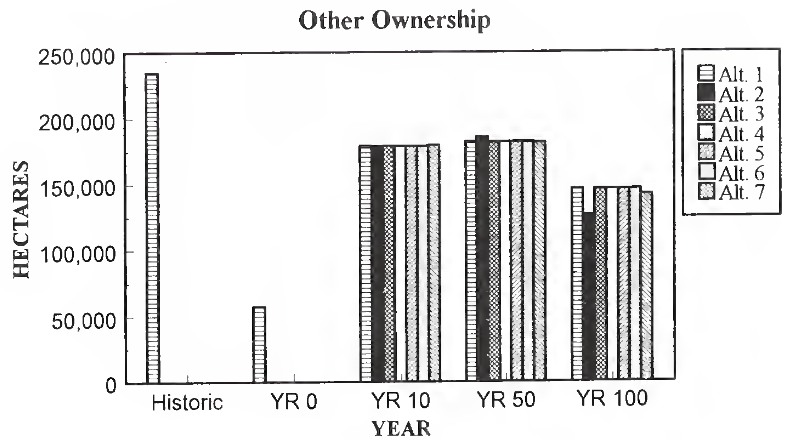


EASTSIDE E.I.S.
MOIST FOREST / LATE-SERAL INTOLERANT MULTI-LAYER

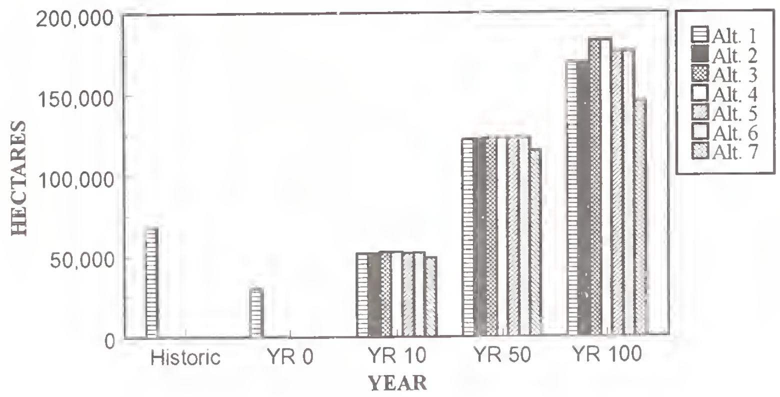




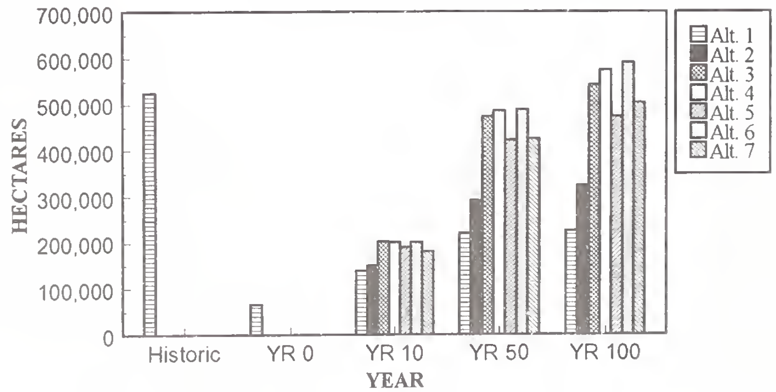


UPPER COLUMBIA RIVER BASIN
MOIST FOREST / LATE-SERAL INTOLERANT MULTI-LAYER

BLM / FS Natural



BLM / FS Other



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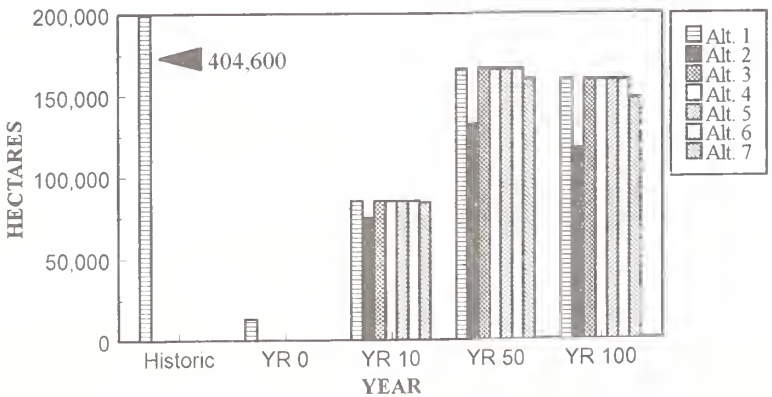
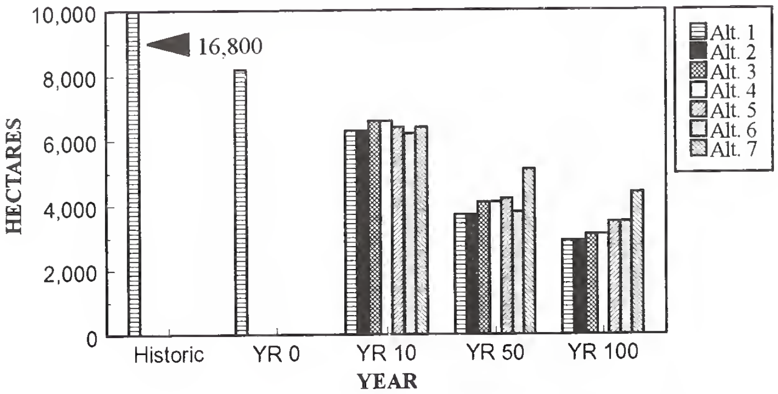
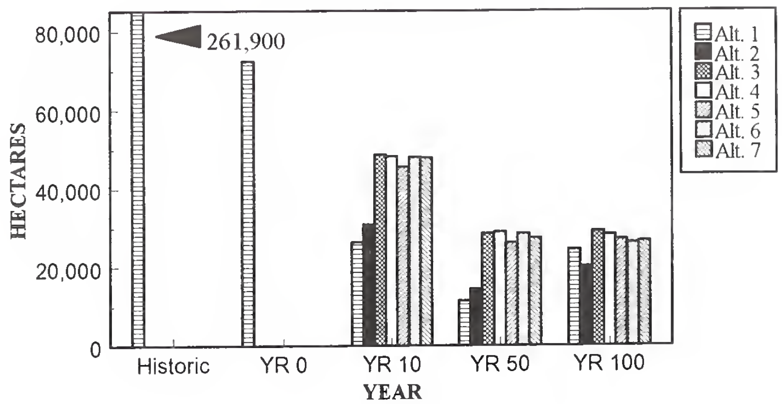


EASTSIDE E. I. S.
MOIST FOREST / LATE-SERAL INTOLERANT SINGLE-LAYER

BLM / FS Natural



BLM / FS Other



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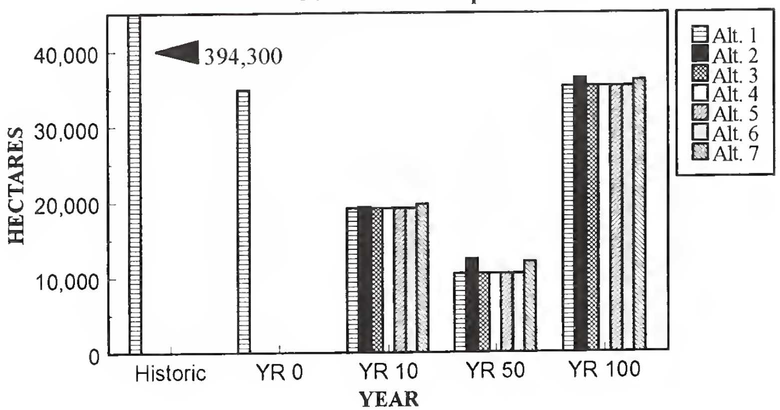
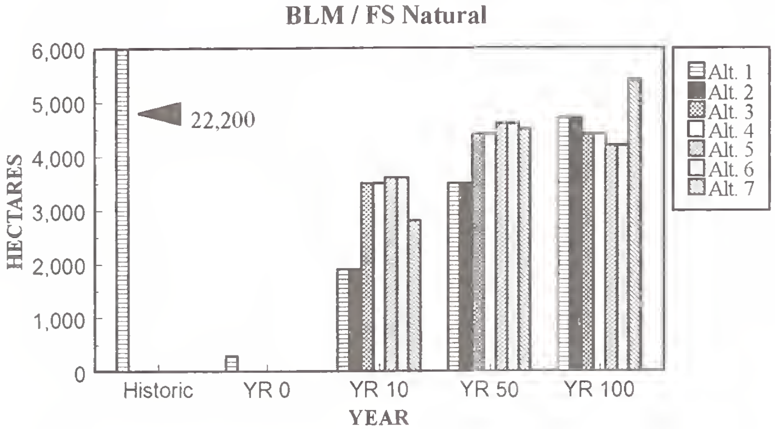
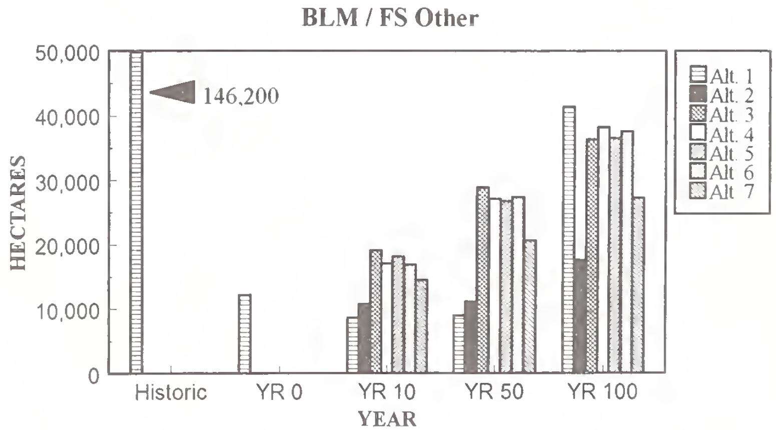
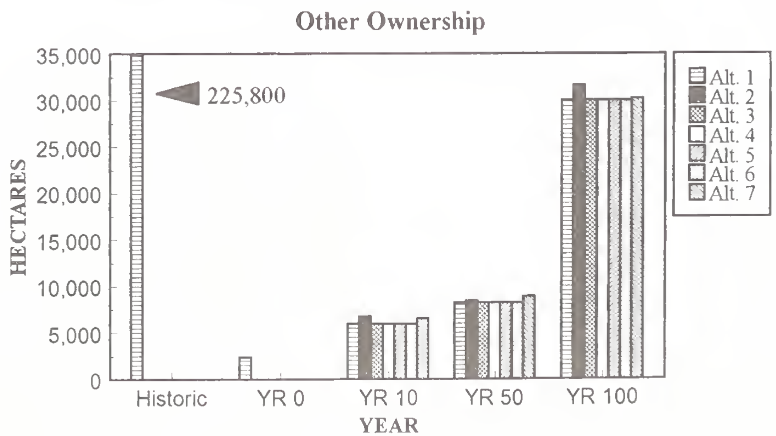


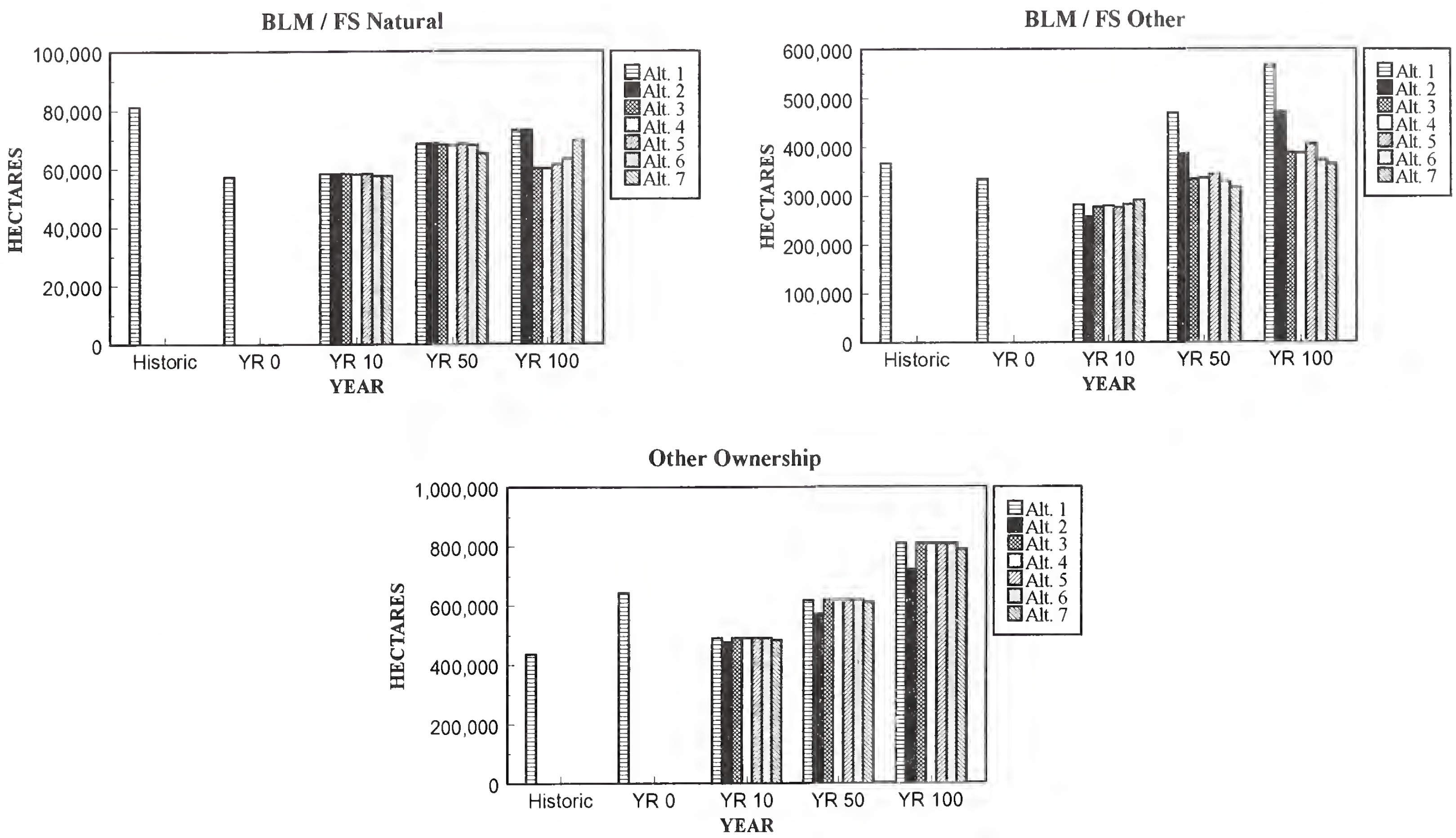
UPPER COLUMBIA RIVER BASIN
MOIST FOREST / LATE-SERAL INTOLERANT SINGLE-LAYER



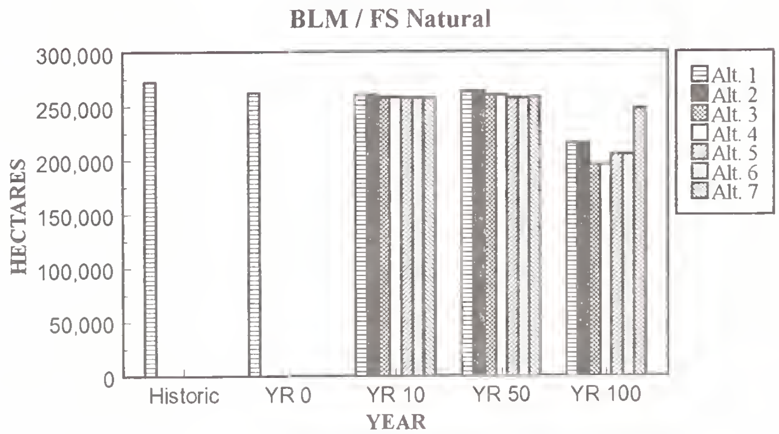


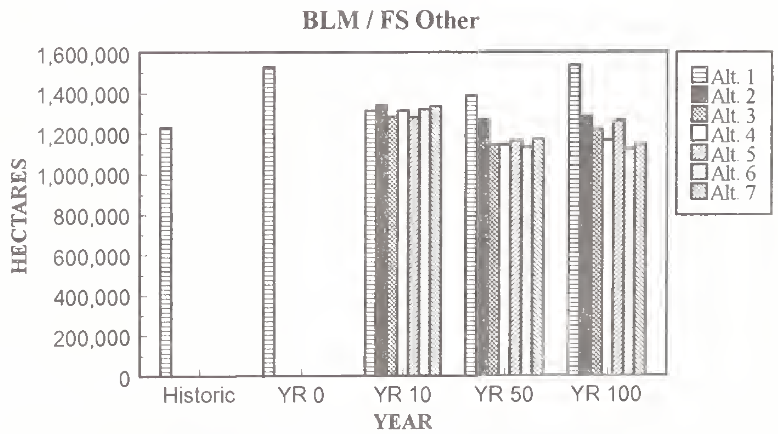


EASTSIDE E.I.S.
MOIST FOREST / MID-SERAL INTOLERANT



UPPER COLUMBIA RIVER BASIN
MOIST FOREST / MID-SERAL INTOLERANT





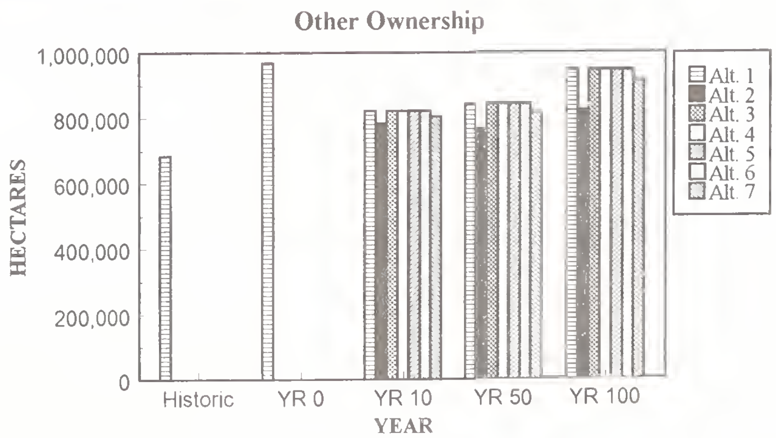


Table 2L.1. Problematic noxious weeds within range cluster 1, where they are problematic within the cluster, acres infested (if available), and the PVTs which they are invading and to which they pose a threat within the dry grass, dry shrub, and cool shrub PVGs.

Weed Species	Location Within Cluster and Acreage[1]	Dry Grass	Dry Shrub	Cool Shrub	Other
Diffuse Knapweed	• Deschutes County, Oregon, BLM Prineville District. (especially along Deschutes River). • Gilliam and Sherman counties, Oregon along John Day River. • Along south fork of John Day River, Grant County, Oregon. • Expected to expand greatly in next 10-20 years. • As reported in 1990, 1million acres in central Oregon, of which 3-5% or 30,000-50,000 acres was on BLM, including some in this cluster.	Wheatgrass Grassland	Antelope Bitterbrush, Big Sagebrush - warm	Mountain Big Sagebrush- Mesic west with Juniper	Riparian in general
Yellow Starthistle	• Especially southern Oregon, Klamath County, BLM Lakeview District. • BLM Prineville District, Oregon; encroaching upon rangeland from private lands, roads, and waterways. • John Day Fossil Beds National Monument, Oregon. • Between Mitchell and John Day River, Wheeler County, Oregon; hundreds of small infestations. • Expected to expand greatly in BLM's Prineville District, Oregon, in next 10-20 years; reported as 20,000 acres in 1990 in central Oregon counties, of which 15% or 3,000 acres was BLM-administered, probably within this cluster.			Mountain Big Sagebrush - Mesic west with Juniper	Riparian in general, White Oak
Rush Skeleton-weed	• BLM's Prineville District, along lower portion of Deschutes River, Oregon; negligible infestation on BLM in 1990 due to its control, but possible infestations in future.		Basin Big Sagebrush		Riparian in general

Table 2L.1 (continued).

Weed Species	Location Within Cluster and Acreage[1]	Dry Grass	Dry Shrub	Cool Shrub	Other
Leafy Spurge	• Near Klamath Falls, Klamath County, Oregon. • As of 1991, not yet on BLM-administered land in Prineville District, Oregon, but predicted soon.			Mountain Big Sagebrush - Mesic west with Juniper	
Medusahead	• Klamath and Lake counties, Oregon; expected to expand greatly in next 10- 20 years. • Jefferson and Wasco counties, Oregon. • Along John Day River all the way to Kimberly, Oregon; reported as extensive along this river. • 1 million acres reported in 1990 from central Oregon, of which 20% or 200,000 acres was on BLM-administered land, including some in this cluster.		Low Sagebrush - Mesic with Juniper; Wyomic Big Sagebrush - Warm	Mountain Big Sagebrush - Mesic west with Juniper	
Dalmatian Toadflax	• Gilliam County, Oregon; on BLM-administered land. • Sherman County, Oregon; along John Day River. • Grant County, Oregon; on private land. • Expected to expand greatly in next 10-20 years. • 25,000 acres reported 1990 from Umatilla, Grant, and Harney counties, Oregon eastward, of which 5% or 1,250 acres was on BLM, including some in this cluster; 5,000 acres reported in 1990 from central Oregon counties, of which less than 1% or 50 acres was on BLM, east of Bend.	Wheatgrass Grassland, Fescue Grassland	Big Sagebrush - warm		Riparian in general, Mountain Mahogany
Whitetop	• Gilliam County, Oregon along John Day River (minor problem in 1989). • Deschutes County, Oregon. • Expected to expand greatly in next 10-20 years.				Riparian in general
Russian Knapweed	• Along Lower John Day River, Oregon (minor problem in 1989, more of a major problem as of 1991). • Prineville BLM District, Oregon, in general.				Riparian in general

Table 2L.1 (continued).

Weed Species	Location Within Cluster and Acreage[1]	Dry Grass	Dry Shrub	Cool Shrub	Other
Scotch Thistle	• Along Lower John Day River, Oregon (minor problem in 1989). • Lakeview area, Oregon; probably private land. • Prineville BLM District in general, along Deschutes River, Oregon.				Riparian in general
Halogeton	• Along Lower John Day River, Oregon (reported as present).				
Perennial Pepperweed	• Along Lower John Day River, Oregon; reported as present.				Riparian in general
Iberian and/or Purple Starthistle	• Sherman and Wasco counties, Oregon; reported as present.				
Canada Thistle	• Widespread.				Riparian in general

[1]Acre = 0.4047 hectare; acres listed are estimates and are not always specific only to BLM- and FS-administered lands.

Table 2L.2– Problematic noxious weeds within range cluster 2, where they are problematic within the cluster, acres infested (if available), and the PVTs which they are invading and to which they pose a threat within the dry grass, dry shrub, and cool shrub PVGs.

Weed Species	Location Within Cluster and Acreage[1]	Dry Grass	Dry Shrub	Cool Shrub	Other
Common Crupina	• Mostly in north-central Washington and central Idaho (not real extensive yet, more in the category of new invaders at present).	Wheatgrass Grassland, Fescue Grassland		Mountain Shrub	Mountain Mahogany, Cottonwood Riverine, Riparian in general
Diffuse Knapweed	• Mostly in Washington in counties bordering Cascade Crest; 820,000 acres in 1993, as reported from half of the eastern Washington counties; including a substantial portion in this cluster.		Antelope Bitterbrush, Big Sagebrush (in general)	Possibly Mountain Big Sagebrush (in general) and Mountain Shrub	
Mediterranean Sage	• Idaho County, Idaho; 4,000 acres reported, including some possibly in this cluster; needs resolving.				
Leafy Spurge	• Central Idaho. Western Montana.	Fescue Grassland, Fescue Grassland with Conifer		Possibly Mountain Big Sagebrush (in general)	Riparian in general
Tansy Ragwort	• Northeast Oregon, Wallowa County.	Proposed: Fescue Grassland, Fescue Grassland with Conifer, Wheatgrass Grassland		Proposed: Mountain Shrub	Proposed: Riparian in general
Spotted Knapweed	• Selway-Bitterroot Wilderness, Idaho, Montana.	Fescue Grassland (mountain meadows)		Possibly Mountain Big Sagebrush (in general)	
Yellow Starthistle	• Idaho County, Idaho, near Hells Canyon.	Wheatgrass Grassland			

[1]Acre = 0.4047 hectare; acres listed are estimates and are not always specific only to BLM- and FS-administered lands.

Table 2L.3 – Problematic noxious weeds within range cluster 3, where they are problematic within the cluster, acres infested (if available), and the PVTs which they are invading and to which they pose a threat within the dry grass, dry shrub, and cool shrub PVGs.

Weed Species	Location Within Cluster and Acreage[1]	Dry Grass	Dry Shrub	Cool Shrub	Other
Whitetop	• Northeast Oregon.	Fescue Grassland, Fescue Grassland with Conifer	Big Sagebrush (in general)	Big Sagebrush (in general)	
Common Crupina	• Central Idaho.	Wheatgrass Grassland, Fescue Grassland		Mountain Shrub	Mountain Mahogany, Cottonwood Riverine, Riparian in general
Diffuse Knapweed	• Northeast Washington; a large portion of the 820,000 acres reported from half of counties in eastern Washington in 1993 are in this cluster. • Northeast Oregon, Union County. • As reported in 1990, about 500,000 acres in Eastern Oregon (Umatilla, Grant, and Harney counties and eastward), of which less than 5,000 was on BLM.		Antelope Bitterbrush	Possibly Mountain Big Sagebrush (in general)	Riparian in general
Spotted Knapweed	• Spokane County, Washington. • Ferry County, Washington. • Northern Idaho. • Northwest Montana.	Fescue Grassland with Conifer, Fescue Grassland, Wheatgrass Grassland		Possibly Mountain Big Sagebrush (in general)	
Yellow Starthistle	• Idaho, Lewis, and Nez Perce counties in Idaho; reported as 300,000 acres in Idaho. • Klamath County, Oregon, Lakeview BLM District.	Wheatgrass Grassland	Antelope Bitterbrush		White Oak
Orange and Yellow Hawkweeds	• Northern Idaho. • Northwest Montana. • Northeast Washington.	Fescue Grassland (mountain meadows)			Riparian in general
Leafy Spurge	• Northeast Oregon along Grande Ronde. • Western Montana. • Idaho.	Fescue Grassland, Fescue Grassland with Conifer		Proposed: Mountain Big Sagebrush (in general)	Riparian in general

Table 2L.3 (continued).

Weed Species	Location Within Cluster and Acreage[1]	Dry Grass	Dry Shrub	Cool Shrub	Other
Squarrose Knapweed	• Union Co. Oregon; about 800 acres reported in 1990 in eastern Oregon, which is Umatilla, Grant, and Harney counties eastward; none on BLM-administered lands.				
Matgrass	• Western Klamath County, Oregon.	Wheatgrass Grassland, Fescue Grassland			
Sulfur Cinquefoil	• Western Montana; thousands of acres. • Idaho Panhandle. • Northeast Washington. • Northeast Oregon.	Wheatgrass Grassland, Fescue Grassland, Fescue Grassland with Conifer			Riparian Graminoid
Mediterranean Sage	• Idaho County, Idaho; 4,000 acres, including some in this cluster.				
Tansy Ragwort	• Union, Baker, Grant counties. in northeast Oregon.	Proposed: Fescue Grassland, Fescue Grassland with Conifer, Wheatgrass Grassland		Proposed: Mountain Shrub	Proposed: Riparian in general
Rush Skeleton-weed	• Baker County, Oregon on the Powder River arm of Brownlee Reservoir; fairly recent (last five years) infestation in this county.				
Canada Thistle	• Widespread.				Riparian in general
Medusahead	• Northeast Oregon.			Mountain Big Sagebrush (in general)	

[1]Acre = 0.4047 hectare; acres listed are estimates and are not always specific only to BLM- and FS-administered lands.

Table 2L.4 – Problematic noxious weeds within range cluster 4, where they are problematic within the cluster, acres infested (if available), and the PVTs which they are invading and to which they pose a threat within the dry grass, dry shrub, and cool shrub PVGs.

Weed Species	Location Within Cluster and Acreage[1]	Dry Grass	Dry Shrub	Cool Shrub	Other
Whitetop	• Northeast Oregon. • Lincoln County, Washington.	Wheatgrass Grassland			Riparian in general
Diffuse Knapweed	• Northern Washington. • Yakima Co. Washington. • Southern Grant Co. Washington. • Some of the 820,000 acres reported from half of eastern Washington counties in 1993 are in this cluster.		Antelope Bitterbrush, Big Sagebrush - Warm		Riparian in general
Russian Knapweed	• East-central Washington. • Yakima County, Washington. • Douglas County, Washington. • Lincoln County, Washington.		Basin Big Sagebrush		Riparian in general
Yellow Starthistle	• Southeast Washington, especially Walla Walla and Columbia counties; 148,000 acres reported for Washington, most of which was in these two counties. • Umatilla County, Oregon; exceeds 286,000 acres, most of which is in this cluster.	Wheatgrass Grassland, Fescue Grassland	Big Sagebrush - Warm		
Rush Skeleton-weed	• Northwest Umatilla County, Vale BLM District, Oregon. • Franklin County, Washington; Juniper Dunes Wilderness Area; possibly on BLM-administered lands in future. • 998,000 acres in 15 eastern Washington counties.	Wheatgrass Grassland, Fescue Grassland			
Leafy Spurge	• Lincoln County, Washington; only 0.5 acre at present.				
Musk Thistle	• Kittitas and Lincoln counties, Washington.				Riparian in general
Dalmatian Toadflax	• Lincoln County, Washington.		Big Sagebrush - Warm		

Table 2L.4 (continued).

Weed Species	Location Within Cluster and Acreage[1]	Dry Grass	Dry Shrub	Cool Shrub	Other
Canada Thistle	• Widespread.				Riparian in general
Syrian Bean-Caper	• Adams, Grant, Okanogan, and Whitman counties, Washington; already present, but in small acreages; possible in future; new invader.	Proposed: Fescue Grassland	Proposed: Big Sagebrush - Warm		
African Rue	• Ephrata in Grant County, Washington; reported as present; new invader.		Proposed: Big Sagebrush - Warm		
Iberian and/or Purple Starthistle	• Asotin and Walla Walla counties, Washington; reported as present; new invader.				
Saltcedar	• Grant and Franklin counties, Washington, along Columbia River; about 350 acres.				Riparian in general

[1] Acre = 0.4047 hectare; acres listed are estimates and are not always specific only to BLM- and FS-administered lands.

Table 2L.5 –Problematic noxious weeds within range cluster 5, where they are problematic within the cluster, acres infested (if available), and the PVTs which they are invading and to which they pose a threat within the dry grass, dry shrub, and cool shrub PVGs.

Weed Species	Location Within Cluster and Acreage[1]	Dry Grass	Dry Shrub	Cool Shrub	Other
Diffuse Knapweed	• Along Cascade Crest in Washington, especially Kittitas County. • Baker Resource Area of BLM's Vale District, Oregon, near Halfway. • As reported in 1990, about 500,000 acres in Eastern Oregon (Umatilla, Grant, and Harney counties and eastward, of which less than 5,000 was on BLM.		Big Sagebrush - Warm, Basin Big Sagebrush	Possibly Mountain Big Sagebrush (in general)	
Yellow Starthistle	• Hells Canyon area, Oregon. • Harney County, Oregon, Andrews Resource Area BLM; minor problem in 1994, possibly bigger problem in future. • Southwest Idaho; reported as 300,000 acres in Idaho, including some in this cluster. • Reported in 1990 as 150,000 acres in eastern Oregon counties, (Umatilla, Grant, and Harney counties eastward; of which 10% or 15,000 acres was on BLM-administered land, including some in this cluster.	Wheatgrass Grassland Big Sagebrush -	Warm (particularly if dominated by cheatgrass)		
Spotted Knapweed	• Eastern Idaho.				
Rush Skeleton-weed	• Southwest Idaho; reported as exceeding 4 million acres, including some in this cluster.	Proposed: Fescue Grassland	Proposed: Big Sagebrush - Warm, Basin Big Sagebrush	Proposed: Mountain Big Sagebrush (in general)	
Medusahead	• Southwest Idaho. • Along Snake River in BLM's Vale District, Oregon. • Steens Mt. Oregon, Harney County. • Elko Coutny, Nevada; 100,000 acres reported, including some in this cluster. • 1.5 million acres reported in 1990 for eastern Oregon counties (Umatilla, Grant, and Harney counties, eastward), of which 60% or 900,000 acres was on BLM-administered land, including some in this cluster. • Nearly 1million acres reported for Idaho, including a substantial but unknown portion in this cluster.	Wheatgrass Grassland	Big Sagebrush - Warm	Mountain Big Sagebrush - Mesic west, Mountain Big Sagebrush - Mesic east, Mountain Big Sagebrush - Mesic west with Juniper	

Table 2L.5 (continued).

Weed Species	Location Within Cluster and Acreage[1]	Dry Grass	Dry Shrub	Cool Shrub	Other
Mediterranean Sage	• Harney County, Oregon, BLM's Andrews Resource Area; minor problem as of 1994, but possible infestation in future. • 500 acres reported in 1990 from eastern Oregon counties, (Umatilla, Grant, and Harney counties eastward), of which 25% or 125 acres was on BLM-administered lands.				
Russian Knapweed	• Harney County, Oregon, BLM's Andrews Resource Area; minor problem as of 1994, but possible bigger problem in future.				Riparian in general
Dalmatian Toadflax	• Harney County, Oregon, BLM's Andrews Resource Area; minor problem as of 1994, but probably bigger problem in future.				
Scotch Thistle	• Harney County, Oregon, BLM's Andrews Resource Area; minor problem as of 1994, but possibly bigger problem in future.				Riparian in general
Perennial Pepperweed	• Harney County, Oregon, BLM's Andrews Resource Area; minor problem as of 1994, but possibly bigger problem in future.				Riparian in general
Whitetop	• Harney County, Oregon, BLM's Andrews Resource Area; minor problem as of 1994, but possibly bigger problem in future.				
Halogeton	• Southeast Oregon, especially in southern Harney County between Fields and Denio. • Owyhee County, Idaho.		Salt Desert Shrub		
Purple Loosestrife	• Along Owyhee River in southeast Oregon; 100 acres reported in 1990 from eastern Oregon counties, (Umatilla, Grant, and Harney counties eastward), including some in this cluster; none reported on BLM-administered lands. • Along Snake River in western Idaho.				Riparian in general
Leafy Spurge	• Eastern Idaho.	Fescue Grassland, Fescue Grassland with Conifer		Proposed: Mountain Big Sagebrush (in general)	Riparian in general

Table 2L.5 (continued).

Weed Species	Location Within Cluster and Acreage[1]	Dry Grass	Dry Shrub	Cool Shrub	Other
Tansy Ragwort	• Wallowa County, Oregon.	Proposed: Fescue Grassland, Fescue Grassland with Conifer, Wheatgrass Grassland		Proposed: Mountain Shrub	Proposed: Riparian in general
Canada Thistle		• Widespread.			Riparian in general

[1]Acre = 0.4047 hectare; acres listed are estimates and are not always specific only to BLM- and FS-administered lands.

Table 2L.6 – Problematic noxious weeds within range cluster 6, where they are problematic within the cluster, acres infested (if available), and the PVTs which they are invading and to which they pose a threat within the dry grass, dry shrub, and cool shrub PVGs.

Weed Species	Location Within Cluster and Acreage[1]	Dry Grass	Dry Shrub	Cool Shrub	Other
Dyers Woad	• Southeast Idaho.	Fescue Grassland, Fescue Grassland with Conifer	Big Sagebrush - Cool	Mountain Big Sagebrush - Mesic east; Mountain Big Sagebrush - Mesic West with Juniper	Aspen
Perennial Pepperweed	• Widespread.				Riparian Graminoid, Salix-Carex, Cottonwood Riverine
Halogeton	• Southeast Oregon; BLM's Lakeview District. • BLM's Vale District, Malheur Resource Area; expected to expand greatly in next 10-20 years. • Idaho.			Salt Desert Shrub	
Diffuse Knapweed	• South-central Idaho, Blaine County; about 50,000 acres. • Eastern Oregon.	Fescue Grassland with Conifer	Big Sagebrush - Warm	Mountain Big Sagebrush (in general)	
Russian Knapweed	• Southeast Idaho; about 12,000 acres. • BLM's Lakeview District BLM, Oregon.				Riparian in general
Yellow Starthistle	• Malheur County, Oregon near Snake River. • Snake River Plains in western Idaho; reported as 300,000 acres in Idaho, some of which is in this cluster. • Reported in 1990 as 150,000 acres in eastern Oregon counties (Umatilla, Grant, and Harney eastward), of which 10% or 15,000 acres was BLM-administered, including some in this cluster.		Wheatgrass Grassland	Antelope Bitterbrush	
Leafy Spurge	• Baker County, Oregon. • Extreme Northeast Oregon, along Grande Ronde; minor problem in 1993, but imminently more problematic. • South-central Idaho, Cassia County. • Eastern Idaho.	Fescue Grassland, Fescue Grassland with Conifer		Mountain Big Sagebrush - Mesic west with Juniper; Mountain Big Sagebrush - Mesic east	Riparian in general

Table 2L.6 (continued).

Weed Species	Location Within Cluster and Acreage[1]	Dry Grass	Dry Shrub	Cool Shrub	Other
Medusahead	• Western Idaho. • Lake Co. Oregon (expected to expand greatly in next 10-20 years). • Harney County, Oregon (especially northeast part). • BLM's Vale District, Oregon; medusahead moving south, expected to expand greatly in next 10-20 years. • 1.5 million acres reported in 1990 for eastern Oregon counties (Umatilla, Grant, and Harney counties eastward), of which 60% or 900,000 acres was on BLM-administered land, including some in this cluster. • Nearly 1million acres reported for Idaho, including a substantial but unknown portion in this cluster.		Big Sagebrush Warm; Low Sagebrush (in general).	Possibly Mountain Big Sagebrush (in general).	
Mediterranean Sage	• Lake and Harney counties, Oregon. • Fremont National Forest; expected to expand greatly in next 10-20 years. • 1 million acres reported in 1990 from central Oregon counties, of which 20% or 200,000 acres was reported on BLM-administered land, most believed to be in this cluster.		Big Sagebrush Warm; Big Sagebrush Cool		
Sulfur Cinquefoil	• Extreme northeast Oregon along Grande Ronde; minor in extent, but could be problematic soon.				Riparian in general
Scotch Thistle	• Extreme northeast Oregon along Grande Ronde; minor in extent, but could be problematic soon. • Along Burnt River Canyon in BLM's Vale District, Oregon.				Riparian in general
Musk Thistle	• Lake County, Oregon; minor problem as of 1991.				Riparian in general
Whitetop	• Lakeview District BLM, Oregon. • BLM's Vale District, Oregon, especially along roads.				Riparian in general

Table 2L.6 (continued).

Weed Species	Location Within Cluster and Acreage[1]	Dry Grass	Dry Shrub	Cool Shrub	Other
Spiny Cocklebur	• BLM's Lakeview • District, Oregon; minor problem as of 1991; new invader.				
St. Johnswort	• Lakeview BLM District, Oregon; minor problem as of 1991.				
Dalmatian Toadflax	• Burns BLM District, Harney County, Oregon; expected to expand greatly in next 10-20 years.				
Spotted Knapweed	• Near Riley, Oregon and along roads in Burns BLM District, Oregon. • Eastern Idaho.				
Purple Loosestrife	• Along Snake and Boise rivers in western Idaho.				Riparian in general
Tansy Ragwort	• Wallowa County, Oregon.	Proposed: Fescue Grassland, Fescue Grassland with Conifer, Wheatgrass Grassland		Proposed: Mountain Shrub	Proposed: Riparian in general
Rush Skeleton-weed	• Western Idaho; reported as exceeding 4 million acres in southwest Idaho, including some in this cluster.	Fescue Grassland	Big Sagebrush Warm, Basin Big Sagebrush	Mountain Big Sagebrush (in general)	
Canada Thistle	• Widespread.				Riparian in general

[1]Acre = 0.4047 hectare; acres listed are estimates and are not always specific only to BLM- and FS-administered lands.

Appendix 2-M

Table 2M.1– Hectares[1] of potential vegetation types within 4th-field subbasins, by potential vegetation group and type, for range cluster 1 on BLM- and FS-administered and Other lands. The High and Moderate Susceptibility categories denote the number of hectares of the PVG that are of either High or Moderate Susceptibility to invasion by at least one of the weed species analyzed in Karl and others (1995) known to be present in this range cluster.

Potential Vegetation Type (PVT)	BLM/FS	Other Lands
	Hectares	
Dry Grass PVG		
Wheatgrass Grassland	22,500	131,100
Fescue Grassland	1,400	21,800
Fescue Grassland with Conifer	21,800	58,700
Total Dry Grass:	45,700	211,600
	(112,925 acres)	(522,864 acres)
High Susceptibility	45,700	211,600
Moderate Susceptibility	45,700	211,600
Dry Shrub PVG		
Antelope Bitterbrush	2,100	3,500
Basin Big Sagebrush	6,000	40,000
Low Sagebrush Mesic	1,400	900
Low Sagebrush Mesic with Juniper	700	28,800
Big Sagebrush Warm	234,500	585,700
Big Sagebrush Cool	31,600	44,000
Salt Desert Shrub	100	
Threetip Sagebrush	300	1,000
Total Dry Shrub:	276,700	703,900
	(683,726 acres)	(1,739,337 acres)
High Susceptibility	2,200	3,500
	(5,436 acres)	(8,648 acres)
Moderate Susceptibility	276,700	703,900
Cool Shrub PVG		
Mountain Big Sagebrush Mesic East	22,700	64,700
Mountain Big Sagebrush Mesic East with Conifer	9,300	9,100
Mountain Big SagebrushMesic West	1,200	3,200
Mountain Big SagebrushMesic West with Juniper	325,600	408,400
Total Cool Shrub:	358,800	485,400
	(886,595 acres)	(1,199,423 acres)
High Susceptibility	0	0
Moderate Susceptibility	358,800	485,400
Other PVGs		
Cottonwood Riverine	400	
Salix-Carex	300	8,800
Aspen	100	200
Mountain Mahogany	400	7,900
Mountain Mahogany with Mountain Big Sagebrush	3,200	8,900
Saltbrush Riparian	200	800
Juniper	13,000	400
Alpine Shrub-Herbaceous	1,000	

[1]Hectare = 2.47 acres

Table 2M.2 – Hectares[1] of potential vegetation types within 4th-field subbasins, by potential vegetation group and type, for range cluster 2 on BLM- and FS-administered (EEIS). The High and Moderate Susceptibility categories denote the number of hectares of the PVG that are of either High or Moderate Susceptibility to invasion by at least one of the weed species analyzed in Karl and others (1995) known to be present in this range cluster.

Potential Vegetation Type	BLM/FS
	Hectares
Dry Grass PVG	
Wheatgrass Grassland	1,300
Fescue Grassland	
Fescue Grassland with Conifer	27,800
Total Dry Grass:	29,100 (71,906 acres)
High Susceptibility	0
Moderate Susceptibility	29,100
Dry Shrub PVG	
Antelope Bitterbrush	4,500
Basin Big Sagebrush	
Low Sagebrush Mesic	
Low Sagebruch Mesic with Juniper	
Big Sagebrush Warm	100
Big Sagebrush Cool	300
Salt Desert Shrub	
Threetip Sagebrush	
Total Dry Shrub:	4,900 (12,108 acres)
High Susceptibility	4,500 (11,119 acres)
Moderate Susceptibility	4,900
Cool Shrub PVG	
Mountain Big Sagebrush Mesic East	1,700
Mountain Big Sagebrush Mesic East with Conifer	4,700
Mountain Big Sagebrush Mesic West	
Mountain Big Sagebrush Mesic West with Juniper	100
Mountain Shrub	2,800
Total Cool Shrub:	9300 (22,980 acres)
High Susceptibility	None
Moderate Susceptibility	9,300
Other PVGs	
Cottonwood Riverine	
Salix-Carex	
Aspen	1,400
Mountain Mahogany	
Mountain Mahogany with Mountain Big Sagebrush	
Saltbrush Riparian	
Juniper	
Alpine Shrub-Herbaceous	22,500

[1] Hectare = 2.47 acres

Table 2M.3 – Hectares[1] of potential vegetation types within 4th-field subbasins, by potential vegetation group and type, for range cluster 2 on BLM- and FS-administered (UCRB). The High and Moderate Susceptibility categories denote the number of hectares of the PVG that are of either High or Moderate Susceptibility to invasion by at least one of the weed species analyzed in Karl and others (1995) known to be present in this range cluster.

Potential Vegetation Type	BLM/FS
	Hectares
Dry Grass PVG	
Wheatgrass Grassland	12,400
Fescue Grassland	100
Fescue Grassland with Conifer	39,300
Total Dry Grass:	51,800
	(127,998 acres)
High susceptibility	51,800
Moderate susceptibility	51,800
Dry Shrub PVG	
Antelope Bitterbrush	
Basin Big Sagebrush	
Low Sagebrush Mesic	
Low Sagebrush Mesic with Juniper	
Big Sagebrush Warm	
Big Sagebrush Cool	4,000
Salt Desert Shrub	
Threetip Sagebrush	
Total Dry Shrub:	4,000
	(9,884 acres)
High Susceptibility	4,000
Moderate susceptibility	4,000
Cool Shrub PVG	
Mountain Big Sagebrush Mesic East	27,700
Mountain Big Sagebrush Mesic East with Conifer	
Mountain Big Sagebrush Mesic West	
Mountain Big Sagebrush Mesic West with Juniper	
Total Cool Shrub:	27,700
	(68,447 acres)
High Susceptibility	0
Moderate Susceptibility	27,700
Other PVGs	
Cottonwood Riverine	
Salix-Carex	
Aspen	18,000
Mountain Mahogany	100
Mountain Mahogany wtih Mountain Big Sagebrush	600
Saltbrush Riparian	
Mountain Riparian Low Shrub	3,500
Juniper	300
Alpine Shrub-Herbaceous	14,900

[1]Hectare = 2.47 acres

Table 2M.4 – Hectares[1] of potential vegetation types within 4th-field subbasins, by potential vegetation group and type, for range cluster 3 on BLM- and FS-administered (EEIS). The High and Moderate Susceptibility categories denote the number of hectares of the PVG that are of either High or Moderate Susceptibility to invasion by at least one of the weed species analyzed in Karl and others (1995) known to be present in this range cluster.

Potential Vegetation Type	BLM/FS
	Hectares
Dry Grass PVG	
Wheatgrass Grassland	3,800
Fescue Grassland	700
Fescue Grassland with Conifer	64,900
Total Dry Grass:	69,400
	(171,487 acres)
High Susceptibility	
Moderate Susceptibility	
Dry Shrub PVG	
Antelope Bitterbrush	2,000
Basin Big Sagebrush	3,600
Low Sagebrush Mesic	
Low Sagebrush Mesic with Juniper	1,000
Big Sagebrush Warm	11,600
Big Sagebruch Cool	6,400
Salt Desert Shrub	
Threetip Sagebrush	
Total Dry Shrub:	24,600
	(60,787 acres)
High Susceptibility	
Moderate Susceptibility	
Cool Shrub PVG	
Mountain Big Sagebrush Mesic East	11,200
Mountain Big Sagebrush Mesic East w/Conifer	19,200
Mountain Big Sagebrush Mesic West	1,300
Mountain Big Sagebrush Mesic West w/Juniper	33,500
Mountain Shrub	1,200
Total Cool Shrub:	66400
	(164074 acres)
High Susceptibility	
Moderate Susceptibility	
Other PVGs	
Cottonwood Riverine	300
Salix-Carex	3,400
Aspen	2,700
Mountain Mahogany	100
Mountain Mahogany w/Mountain Big Sagebrush	700
Saltbrush Riparian	700
Mountain Riparian Low Shrub	
Juniper	
Alpine Shrub-Herbaceous	5,800

[1]Hectare = 2.47 acres

Table 2M.5 – Hectares[1] of potential vegetation types within 4th-field subbasins, by potential vegetation group and type, for range cluster 3 on BLM- and FS-administered (UCRB). The High and Moderate Susceptibility categories denote the number of hectares of the PVG that are of either High or Moderate Susceptibility to invasion by at least one of the weed species analyzed in Karl and others (1995) known to be present in this range cluster.

Potential Vegetation Type	BLM/FS
	Hectares
Dry Grass PVG	
Wheatgrass Grassland	10,100
Fescue Grassland	5,400
Fescue Grassland w/Conifer	67,900
Total Dry Grass:	83,400
	(206,081 acres)
High Susceptibility	83,400
Moderate Susceptibility	83,400
Dry Shrub PVG	
Antelope Bitterbrush	
Basin Big Sagebrush	
Low Sagebrush Mesic	
Low Sagebruch Mesic with Juniper	
Big Sagebrush Warm	
Big Sagebrush Cool	1,300
Salt Desert Shrub	
Threetip Sagebrush	100
Total Dry Shrub:	1,400
	(3,459 acres)
High Susceptibility	0
Moderate Susceptibility	1,400
Cool Shrub PVG	
Mountain Big Sagebrush Mesic East	21,500
Mountain Big Sagebrush Mesic East with Conifer	
Mountain Big Sagebrush Mesic West	
Mountain Big Sagebrush Mesic West with Juniper	800
Total Cool Shrub:	22,300
	(55,103 acres)
High Susceptibility	0
Moderate Susceptibility	22,300
Other PVGs	
Cottonwood Riverine	
Salix-Carex	3,900
Aspen	39,800
Mountain Mahogany	
Mountain Mahogany with Mountain Big Sagebrush	
Saltbrush Riparian	100
Mountain Riparian Low Shrub	1,400
Juniper	
Alpine Shrub-Herbaceous	800

[1]Hectare = 2.47 acres

Table 2M.6 – Hectares[1] of potential vegetation types within 4th-field subbasins, by potential vegetation group and type, for range cluster 4 on BLM- and FS-administered (EEIS). The High and Moderate Susceptibility categories denote the number of hectares of the PVG that are of either High or Moderate Susceptibility to invasion by at least one of the weed species analyzed in Karl and others (1995) known to be present in this range cluster.

Potential Vegetation Type	BLM/FS
	Hectares
Dry Grass PVG	
Agropyron Steppe	5,400
Fescue Grassland	3,500
Fescue Grassland w/Conifer	19,700
Total Dry Grass:	28,600
	(70,671 acres)
High Susceptibility	
Moderate Susceptibility	
Dry Shrub PVG	
Antelope Bitterbrush	1,500
Basin Big Sagebrush	6,800
Low Sagebrush Mesic	
Low Sagebrush Mesic weith Juniper	
Big Sagebrush Warm	37,700
Big Sagebrush Cool	400
Salt Desert Shrub	
Threetip Sagebrush	600
Dry Shrub Total:	47,000
	(116,137 acres)
High Susceptibility	
Moderate Susceptibility	
Cool Shrub PVG	
Mountain Big Sagebrush Mesic East	400
Mountain Big Sagebrush Mesic East with Conifer	
Mountain Big Sagebrush Mesic West	2,100
Mountain Big Sagebrush Mesic West with Juniper	2,500
Total Cool Shrub:	5,000
	(12,355 acres)
High Susceptibility	
Moderate Susceptibility	
Other PVGs	
Cottonwood Riverine	
Salix-Carex	1,400
Aspen	5,100
Mountain Mahogany	
Mountain Mahogany with Mountain Big Sagebrush	
Saltbrush Riparian	100
Mountain Riparian Low Shrub	
Juniper	
Alpine Shrub-Herbaceous	400

[1]Hectare = 2.47 acres

Table 2M.7–Hectares[1] of potential vegetation types within 4th-field subbasins, by potential vegetation group and type, for range cluster 5 on BLM- and FS-administered and Other lands (EEIS). The High and Moderate Susceptibility categories denote the number of hectares of the PVG that are of either High or Moderate Susceptibility to invasion by at least one of the weed species analyzed in Karl and others (1995) known to be present in this range cluster.

Potential Vegetation Type	BLM/FS	Other Lands
	Hectares	
Dry Grass PVG		
Wheatgrass Grassland	17,400	8,000
Fescue Grassland	5,900	3,100
Fescue Grassland w/Conifer	54,400	29,100
Total Dry Grass:	77,700	40,200
High Susceptibility	77,700	40,200
	(191,997 acres)	(99,334 acres)
Moderate Susceptibility	77,700	40,200
Dry Shrub PVG		
Antelope Bitterbrush	4,000	14,600
Basin Big Sagebrush	14,000	79,000
Low Sagebrush Mesic	117,500	12,400
Low Sagebrush Mesic w/Juniper	200	
Low Sage Xeric	12,200	3,000
Big Sagebrush Warm	594,200	273,600
Big Sagebrush Cool	11,500	10,200
Salt Desert Shrub	144,400	23,000
Threetip Sagebrush	300	1,600
Total Dry Shrub:	898,300	417,400
High Susceptibility	754,100	321,400
	(1,863,381 acres)	(794,179 acres)
Moderate Susceptibility	898,300	417,400
	(2,219,699 acres)	(1,031,395 acres)
Cool Shrub PVG		
Mountain Big Sagebrush Mesic East	71,400	46,400
Mountain Big Sagebrush Mesic East w/Conifer	300	100
Mountain Big Sagebrush Mesic West	154,600	23,500
Mountain Big Sagebrush Mesic West w/Juniper	20,500	33,700
Mt. Shrub	800	2,900
Total Cool Shrub:	247,600	106,600
High Susceptibility	0	0
Moderate Susceptibility	247,600	106,600
	(611,820 acres)	(263,409 acres)
Other PVGs		
Cottonwood Riverine		8,100
Salix-Carex	200	2,500
Aspen	6,400	900
Mountain Mahogany with Mountain Big Sagebrush	2,000	300
Saltbrush Riparian	2,600	7,500
Juniper	4,500	600
Alpine Shrub-Herbaceous	10,700	500

[1]Hectare = 2.47 acres

Table 2M.8 – Hectares[1] of potential vegetation types within 4th-field subbasins, by potential vegetation group and type, for range cluster 5 on BLM- and FS-administered and Other lands (UCRB). The High and Moderate Susceptibility categories denote the number of hectares of the PVG that are of either High or Moderate Susceptibility to invasion by at least one of the weed species analyzed in Karl and others (1995) known to be present in this range cluster.

Potential Vegetation Type	BLM/FS	Other Lands
	Hectares	
Dry Grass PVG		
Wheatgrass Grassland	32,500	4,900
Fescue Grassland	72,500	10,100
Fescue Grassland with Conifer	234,300	57,000
Total Dry Grass:	339,300	72,000
High Susceptibility	339,300	72,000
	(838,410 acres)	(177,912 acres)
Moderate Susceptibility	339,300	72,000
	(838,410 acres)	(177,912 acres)
Dry Shrub PVG		
Antelope Bitterbrush	32,800	10,600
Basin Big Sage Steppe	42,100	29,900
Low Sagebrush Mesic	303,900	89,500
Low Sagebrush Mesic with Juniper	5,800	800
Low Sage Xeric	90,600	78,200
Big Sagebrush Warm	1,086,200	220,900
Big Sagebrush Cool	307,400	51,200
Salt Desert Shrub	77,900	45,000
Threetip Sagebrush	77,300	32,100
Total Dry Shrub:	2,024,000	558,200
High Susceptibility	0	0
Moderate Susceptibility	2,024,000	558,200
	(5,001,304 acres)	(1,379,312 acres)
Cool Shrub PVG		
Mountain Big Sagebrush Mesic East	635,900	135,300
Mountain Big Sagebrush Mesic East with Conifer	4,900	1,700
Mountain Big Sagebrush Mesic West	665,800	72,700
Mountain Big Sagebrush Mesic West with Juniper	75,700	23,300
Mountain Shrub	400	1,000
Total Cool Shrub:	1,382,700	234,000
High Susceptibility	0	0
Moderate Susceptibility	1,382,700	234,000
	(3,416,652 acres)	(578,214 acres)
Other PVGs		
Cottonwood Riverine	1,200	5,700
Salix-Carex	1,200	400
Aspen	154,700	26,100
Mt. Mahogany	1,400	500
Mt. Mahogany with Mountain Big Sagebrush	27,900	1,600
Saltbrush Riparian	24,500	21,300
Mountain Riparian Low Shrub	1,000	
Juniper	12,000	3,600
Alpine Shrub-Herbaceous	17,300	1,000

[1]Hectare = 2.47 acres

Table 2M.9 – Hectares[1] of potential vegetation types within 4th-field subbasins, by potential vegetation group and type, for range cluster 6 on BLM- and FS-administered and Other lands (EEIS). The High and Moderate Susceptibility categories denote the number of hectares of the PVG that are of either High or Moderate Susceptibility to invasion by at least one of the weed species analyzed in Karl and others (1995) known to be present in this range cluster.

Potential Vegetation Type	BLM/FS	Other Lands
	Hectares	
Dry Grass PVG		
Wheatgrass Grassland	14,700	14,200
Fescue Grassland	6,200	4,600
Fescue Grassland w/Conifer	40,500	55,500
Total Dry Grass:	61,400	74,300
	(151,719 acres)	
High Susceptibility	61,400	
Moderate Susceptibility	61,400	
Dry Shrub PVG		
Antelope Bitterbrush	300	
Basin Big Sagebrush	26,400	31,100
Low Sagebrush Mesic	86,500	75,900
Low Sagebrush Mesic with Juniper	2,000	1,300
Low Sagebrush Xeric	40,200	21,800
Big Sagebrush Warm	2,403,400	922,400
Big Sagebrush Cool	75,000	34,900
Salt Desert Shrub	456,200	93,300
Threetip Sagebrush	400	300
Total Dry Shrub:	3,090,400	1,181,000
	(7,636,378 acres)	
High Susceptibility		
Moderate Susceptibility		
Cool Shrub PVG		
Mountain Big Sagebrush Mesic East	162,700	112,300
Mountain Big Sagebrush Mesic East with Conifer	18,400	1,800
Mountain Big Sagebrush Mesic West	36,800	13,600
Mountain Big Sagebrush Mesic West with Juniper	52,500	80,900
Mountain Shrub	100	
Total Cool Shrub:	270,500	208,600
	(668,405 acres)	
High Susceptibility		
Moderate Susceptibility		
Other PVGs		
Cottonwood Riverine		
Salix-Carex	200	500
Aspen	4,200	1,500
Mountain Mahogany	300	700
Mountain Mahogany with Mountain Big Sagebrush	37,200	9,500
Saltbrush Riparian	73,300	40,900
Juniper	6,000	6,300
Alpine Shrub-Herbaceous	1,400	800

[1]Hectare = 2.47 acres

Table 2M.10 – Hectares[1] of potential vegetation types within 4th-field subbasins, by potential vegetation group and type, for range cluster 6 on BLM- and FS-administered and Other lands (UCRB). The High and Moderate Susceptibility categories denote the number of hectares of the PVG that are of either High or Moderate Susceptibility to invasion by at least one of the weed species analyzed in Karl and others (1995) known to be present in this range cluster.

Potential Vegetation Type	BLM/FS	Other Lands
	Hectares	
Dry Grass PVG		
Wheatgrass Grassland	9,500	20,700
Fescue Grassland	31,600	30,700
Fescue Grassland with Conifer	144,200	73,600
Total Dry Grass:	185300 (457,876 acres)	125,000
High Susceptibility	185,300	
Moderate Susceptibility	185,300	
Dry Shrub PVG		
Antelope Bitterbrush	5,000	4,200
Basin Big Sagebrush	92,400	62,400
Low Sagebrush Mesic	41,300	52,400
Low Sagebrush Mesic with Juniper		-
Low Sagebrush Xeric	43,100	69,500
Big Sagebrush Warm	1,468,200	729,400
Big Sagebrush Cool	40,600	18,400
Salt Desert Shrub	12,900	11,300
Threetip Sagebrush	10,500	16,100
Total Dry Shrub:	1,714,000	963,700
High Susceptibility		
Moderate Susceptibility		
Cool Shrub PVG		
Mountain Big Sagebrush Mesic East	337,600	192,900
Mountain Big Sagebrush Mesic East with Conifer	1,800	9,300
Mountain Big Sagebrush Mesic West	74,200	36,100
Mountain Big Sagebrush Mesic West with Juniper	51,700	83,200
Mountain Shrub	5,800	12,200
Total Cool Shrub:	471,100	333,700
High Susceptibility		
Moderate Susceptibility		
Other PVGs		
Cottonwood Riverine	100	100
Salix-Carex	500	15,800
Aspen	168,800	253,000
Mountain Mahogany	6,400	78,300
Mountain Mahogany with Mountain Big Sagebrush	300	1,400
Saltbrush Riparian	17,200	24,100
Mountain Riparian Low Shrub		2,300
Juniper	14,400	6,600
Alpine Shrub-Herbaceous	4,300	300

[1]Hectare = 2.47 acres

Appendix 2-N

Table 2N.1 – Emphasis of integrated weed management for PVTs in the dry grass potential vegetation group by range cluster and alternative including: assumed acres[1] for weed control and livestock management per decade, integrated weed management steps, and PVTs prioritized for control efforts, in the EEIS area.

Range Cluster	Weed Control[1]	Livestock Management[1]	IWM Step Emphasis	PVT Susceptibility Emphasis
			Alternative 3	
1	17,500	22,500	5, 6, and 7	High
2	0	0	1 through 4	High
3	0	0	1 through 7	High
4	0	0	5, 6, and 7	High
5	30,000	42,500	5, 6, and 7	High
6	77,500	120,000	5, 6, and 7	High
			Alternative 4	
1	17,500	22,500	5, 6, and 7	High and Moderate
2	0	0	1 through 7	High and Moderate
3	0	0	5, 6, and 7	High and Moderate
4	0	0	5, 6, and 7	High and Moderate
5	30,000	72,500	5, 6, and 7	High and Moderate
6	125,000	212,500	5, 6, and 7	High and Moderate
			Alternative 5	
1	2,500	2,500	5, 6, and 7	High
2	0	0	1 through 4	High
3	0	0	1 through 7	High
4	0	0	1 through 4	High
5	2,500	12,500	1 through 7	High
6	22,500	40,000	5, 6, and 7	High
			Alternative 6	
1	12,500	22,500	5, 6, and 7	High and Moderate
2	0	0	1 through 7	High and Moderate
3	0	0	1 through 7	High and Moderate
4	0	0	5, 6, and 7	High and Moderate
5	7,500	72,500	1 through 7	High and Moderate
6	87,500	215,000	5, 6, and 7	High and Moderate
			Alternative 7	
1	7,500	17,500	5, 6, and 7	High
2	0	0	1 through 4	High
3	0	0	1 through 7	High
4	0	0	5, 6, and 7	High
5	17,500	32,500	5, 6, and 7	High
6	45,000	137,500	5, 6, and 7	High

[1]Acreage on this table reflects modifications of further EIS analyses and, therefore, may be inconsistent with some text references based on earlier analyses; acre = 0.4047 hectare.

Table 2N.2 – Emphasis of integrated weed management for PVTs in the dry grass potential vegetation group by range cluster and alternative, including: assumed acres[1] for weed control and livestock management per decade, integrated weed management steps to be emphasized, and PVTs prioritized for control efforts, in the UCRB EIS area.

Range Cluster	Weed Control[1]	Livestock Management[1]	IWM Step Emphasis	PVT Susceptibility Emphasis
			Alternative 3	
2	0	0	1 through 4	High
3	0	0	1 through 7	High
5	90,000	140,000	5, 6, and 7	High
6	52,500	77,500	5, 6, and 7	High
			Alternative 4	
2	0	0	1 through 7	High and Moderate
3	0	0	5, 6, and 7	High and Moderate
5	92,500	247,500	5, 6, and 7	High and Moderate
6	82,500	140,000	5, 6, and 7	High and Moderate
			Alternative 5	
2	0	0	1 through 4	High
3	0	0	1 through 7	High
5	12,500	45,000	1 through 7	High
6	17,500	27,500	5, 6, and 7	High
			Alternative 6	
2	0	0	1 through 7	High and Moderate
3	2,500	0	1 through 7	High and Moderate
5	30,000	247,500	1 through 7	High and Moderate
6	55,000	140,000	5, 6, and 7	High and Moderate
			Alternative 7	
2	0	0	1 through 4	High
3	0	0	1 through 7	High
5	50,000	115,000	5, 6, and 7	High
6	27,500	92,500	5, 6, and 7	High

[1]Acreage figures on this table reflect modifications of further EIS analyses and, therefore, may be inconsistent with some text references based on earlier analyses; acre = 0.4047 hectare.

Table 2N.3 – Emphasis of integrated weed management for PVTs in the dry shrub potential vegetation group by range cluster and alternative, including: assumed acres[1] scheduled for weed control and livestock management per decade, integrated weed management steps, and PVTs prioritized for control efforts, in the EEIS area.

Cluster	Weed Control[1]	Livestock Management[1]	IWM Step Emphasis	PVT Susceptibility Emphasis
			Alternative 3	
1	67,500	105,000	5, 6, and 7	High
2	0	7,500	1 through 4	High
3	0	7,500	1 through 7	High
4	2,500	2,500	5, 6, and 7	High
5	140,000	185,000	5, 6, and 7	High
6	370,000	552,500	5, 6, and 7	High
			Alternative 4	
1	72,500	112,500	5, 6, and 7	High and Moderate
2	2,500	7,500	1 through 7	High and Moderate
3	2,500	12,500	5, 6, and 7	High and Moderate
4	2,500	2,500	5, 6, and 7	High and Moderate
5	147,500	357,500	5, 6, and 7	High and Moderate
6	625,000	1,052,500	5, 6, and 7	High and Moderate
			Alternative 5	
1	22,500	40,000	5, 6, and 7	High
2	0	7,500	1 through 4	High
3	2,500	7,500	1 through 7	High
4	2,500	2,500	1 through 4	High
5	57,500	215,000	1 through 7	High
6	422,500	640,000	5, 6, and 7	High
			Alternative 6	
1	72,500	112,500	5, 6, and 7	High and Moderate
2	0	2,500	1 through 7	High and Moderate
3	2,500	12,500	1 through 7	High and Moderate
4	2,500	2,500	5, 6, and 7	High and Moderate
5	55,000	357,500	1 through 7	High and Moderate
6	390,000	1,055,000	5, 6, and 7	High and Moderate
			Alternative 7	
1	17,500	30,000	5, 6, and 7	High
2	0	0	1 through 4	High
3	0	2,500	1 through 7	High
4	2,500	2,500	5, 6, and 7	High
5	35,000	70,000	5, 6, and 7	High
6	85,000	280,000	5, 6, and 7	High

[1]Acreage figures in this table reflect modifications of further EIS analyses and, therefore, may be inconsistent with some text references based on earlier analyses; acre = 0.4047 hectare.

Table 2N.4 – Emphasis of integrated weed management for PVTs in the dry shrub potential vegetation group by range cluster and alternative, including: assumed acres[1] scheduled for weed control and livestock management per decade, integrated weed management steps, and PVTs prioritized for control efforts, in the UCRB EIS area.

Cluster	Weed Control[1]	Livestock Management[1]	IWM Step Emphasis	PVT Susceptibility Emphasis
			Alternative 3	
2	0	7,500	1 through 4	High
3	0	7,500	1 through 7	High
5	427,500	650,000	5, 6, and 7	High
6	247,500	370,000	5, 6, and 7	High
			Alternative 4	
2	0	7,500	1 through 7	High and Moderate
3	2,500	7,500	5, 6, and 7	High and Moderate
5	455,000	1,245,000	5, 6, and 7	High and Moderate
6	417,500	692,500	5, 6, and 7	High and Moderate
			Alternative 5	
2	0	7,500	1 through 4	High
3	2,500	7,500	1 through 7	High
5	155,000	740,000	1 through 7	High
6	287,500	422,500	5, 6, and 7	High
			Alternative 6	
2	2,500	7,500	1 through 7	High and Moderate
3	0	7,500	1 through 7	High and Moderate
5	150,000	1,240,000	1 through 7	High and Moderate
6	265,000	697,500	5, 6, and 7	High and Moderate
			Alternative 7	
2	0	0	1 through 4	High
3	0	2,500	1 through 7	High
5	102,500	232,500	5, 6, and 7	High
6	60,000	182,500	5, 6, and 7	High

[1]Acreage figures in this table reflect modifications of further EIS analyses and, therefore, may be inconsistent with some text references based on earlier analyses; acre = 0.4047 hectare.

Table 2N.5 – Emphasis of integrated weed management for PVTs in the cool shrub potential vegetation group by range cluster and alternative, including: assumed acres[1] scheduled for weed control and livestock management per decade, integrated weed management steps, and PVTs prioritized for control efforts, in the EEIS EIS area.

Cluster	Weed Control[1]	Livestock Management[1]	IWM Step Emphasis	PVT Susceptibility Emphasis
			Alternative 3	
1	17,500	22,500	5, 6, and 7	High
2	0	0	1 through 4	High
3	0	2,500	1 through 7	High
4	0	0	5, 6, and 7	High
5	30,000	40,000	5, 6, and 7	High
6	77,500	120,000	5, 6, and 7	High
			Alternative 4	
1	7,500	12,500	5, 6, and 7	High and Moderate
2	0	0	1 through 7	High and Moderate
3	0	0	5, 6, and 7	High and Moderate
4	0	0	5, 6, and 7	High and Moderate
5	22,500	50,000	5, 6, and 7	High and Moderate
6	80,000	145,000	5, 6, and 7	High and Moderate
			Alternative 5	
1	7,500	7,500	5, 6, and 7	High
2	0	2,500	1 through 4	High
3	0	2,500	1 through 7	High
4	0	0	1 through 4	High
5	7,500	40,000	1 through 7	High
6	85,000	120,000	5, 6, and 7	High
			Alternative 6	
1	12,500	12,500	5, 6, and 7	High and Moderate
2	0	0	1 through 7	High and Moderate
3	0	0	1 through 7	High and Moderate
4	0	0	5, 6, and 7	High and Moderate
5	7,500	50,000	1 through 7	High and Moderate
6	50,000	145,000	5, 6, and 7	High and Moderate
			Alternative 7	
1	7,500	17,500	5, 6, and 7	High
2	0	0	1 through 4	High
3	0	0	1 through 7	High
4	0	0	5, 6, and 7	High
5	17,500	35,000	5, 6, and 7	High
6	45,000	135,000	5, 6, and 7	High

[1]Acreage figures in this table reflect modifications of further EIS analyses and, therefore, may be inconsistent with text references based on earlier analyses; acre = 0.4047 hectare.

Table 2N.6 – Emphasis of integrated weed management for PVTs in the cool shrub potential vegetation group by range cluster and alternatiave, including: assumed acres[1] scheduled for weed control and livestock management per decade, integrated weed management steps, and PVTs prioritized for control efforts, in the UCRB EIS area.

Cluster	Weed Control[1]	Livestock Management[1]	IWM Step Emphasis	PVT Susceptibility Emphasis
			Alternative 3	
2	0	0	1 through 4	High
3	0	0	1 through 7	High
5	90,000	140,000	5, 6, and 7	High
6	52,500	77,500	5, 6, and 7	High
			Alternative 4	
2	0	0	1 through 7	High and Moderate
3	0	0	5, 6, and 7	High and Moderate
5	60,000	167,500	5, 6, and 7	High and Moderate
6	55,000	92,500	5, 6, and 7	High and Moderate
			Alternative 5	
2	0	0	1 through 4	High
3	0	0	1 through 7	High
5	30,000	142,500	1 through 7	High
6	55,000	77,500	5, 6, and 7	High
			Alternative 6	
2	0	0	1 through 7	High and Moderate
3	0	0	1 through 7	High and Moderate
5	20,000	167,500	1 through 7	High and Moderate
6	35,000	92,500	5, 6, and 7	High and Moderate
			Alternative 7	
2	0	0	1 through 4	High
3	0	0	1 through 7	High
5	50,000	117,500	5, 6, and 7	High
6	30,000	92,500	5, 6, and 7	High

[1]Acreage figures in this table reflect modifications of further EIS analyses and, therefore, may be inconsistent with text references based on earlier analyses; acre = 0.4047 hectare.

CHAPTER 3

Effects of Proposed Alternatives on Aquatic Habitats and Native Fishes

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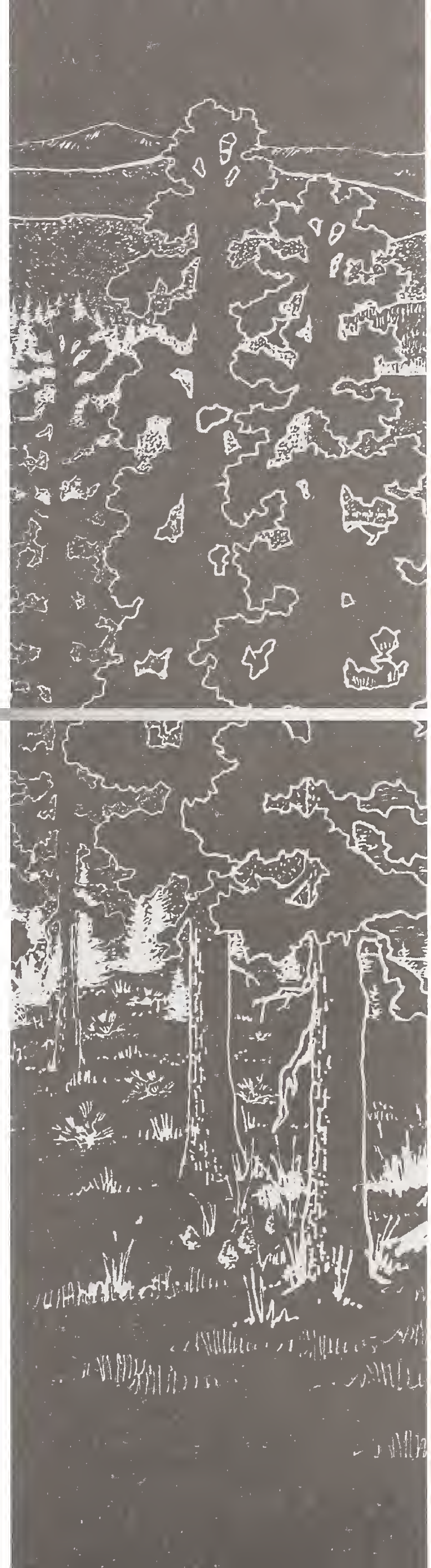

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Introduction

The Aquatics and Riparian Science Teams analyzed the seven alternatives by evaluating their effectiveness in sustaining aquatic ecosystem structure and function, and their expected effect on 25 taxa of native fishes. Our analysis focused on alternatives as defined in Chapter 3 of the Preliminary Draft Environmental Impact Statements (EISs) (USDA and USDI 1996a, 1996b).[1] The analysis consisted of three steps. In step one, we identified the level of protection, maintenance, or restoration of aquatic and riparian habitats offered by each alternative. In step two, we identified expected changes in distribution and status of seven widely-distributed salmonid species that would likely result from implementation of each alternative. Step three involved a similar, though less intensive, effort to identify expected changes in the populations of 18 more narrowly-distributed fish species of special concern. Each step built on the preceding one, as the sections below demonstrate.

Our assessment is based on professional interpretation of both quantitative and qualitative information collected for the purpose of this evaluation or generated as part of the broader scientific assessment (Lee and others, in press). Participants in the evaluation (evaluation team) included Forest Service (FS) and Bureau of Land Management (BLM) scientists from the Science Integration Team (SIT) Aquatics Team that participated in the Broadscale Assessment of Aquatics Species and Habitats (Lee and others, in press), and additional invited scientists from the FS, Environmental Protection Agency (EPA), National Marine Fisheries Service (NMFS), and U.S. Fish and Wildlife Service (USFWS) (appendix 3-A). Information relative to the alternatives and individual fish species were prepared by the SIT, Eastside EIS (EEIS) and Upper Columbia River Basin EIS (UCRB) staffs and presented to the evaluation team in a series of discussions held at the Forestry Sciences Laboratory in Boise, Idaho, on March 7 and 8, and 11 to 13, 1996. The intent of the discussions was to explore issues and probable outcomes associated with each alternative. A series of questions was developed by the evaluation team and used to guide discussion (described below). Notes taken during the discussion were used by the SIT aquatics team to frame the issues and formulate the evaluation in this report. The conclusions presented herein reflect the consensus view of the SIT Aquatics Team that participated in the evaluation.

Our analysis remains subjective in the sense that to draw conclusions we filtered the anticipated allocations and patterns of ground-disturbing and restoration activities, and the current distribution and status of fishes through our understanding of the likely mitigative effects of each alternative. Our analysis is based in existing data and spatial patterns in those data. We believe any interpretations that must rationalize conclusions against existing species distributions, patterns of disturbance, and relationships between the two cannot strongly diverge from those we have made in our analysis. In the time available for analysis, however, we had the choice to either develop data and relationships on which to base our opinions or more systematically develop opinions expressed without the benefit of any detailed understanding or data. We chose to draw conclusions from data and relationships.

In our evaluation, we refer to two separate elements of a species' range, core and fringe. Core areas refer to those portions of the species' distribution where there are concentrations of strong populations (strongholds) and the species is well distributed among adjacent watersheds and subbasins. Generally, such areas are found toward the central part of the species' distribution, but may

[1]Analysis of the seven alternatives is based on the definitions found in the preliminary draft version of the Environmental Impact Statements (February 1996). Detailed information cited in this chapter pertaining to the Preliminary Draft EIS is reproduced in appendix I in Volume II of this document.

occur broadly across the Basin.[2] For anadromous species with very few strong populations remaining, core areas are distinguished by large, contiguous blocks that are occupied by the species. For example, the central Idaho subbasins of the Salmon River would be considered core areas for steelhead, even though populations are generally depressed in that area. In general, we anticipate that populations associated with the core(s) of a species' distribution are most likely to persist in the face of environmental change and disturbance (Lee and others, in press). Strong populations generally support the full expression of life histories including migratory forms, and are likely to be more resilient than depressed populations or those on the fringe of the species' range. We believe conservation of core areas is critical to species preservation, since these areas are most likely to persist in the face of unforeseen environmental change. In contrast, fringe areas refer to the portions of the range that are on the periphery of the species' range. Fringe areas are characterized by a relatively small number of occupied watersheds that are often isolated from the larger portions of the species' range. Fringe areas are potentially important because they may include significant portions of the genetic variability found in a species. The core and fringe distributions considered in this analysis are based on the distribution and status of fishes as described in Lee and others (in press).

In the sections below, we describe each step in the evaluation process. Within each step, we present major assumptions and information used in the evaluation, criteria or questions used to judge alternatives, major findings, and major uncertainties.

Aquatic Viability Analysis: Species, Rationale, and Approach

Our analysis of viability was directed exclusively at fish by examining fish distribution and status, and inferred habitat conditions as influenced by allocations and patterns of ground-disturbing and restoration activities. The analysis consisted of two parts. Part one addressed the viability of the seven widely-distributed salmonids focused on in the aquatics assessment (Lee and others, in press): bull trout, redband trout, westslope and Yellowstone cutthroat trout, ocean-type and stream-type chinook salmon, and steelhead trout. As discussed in Lee and others (in press), these species are viewed as important indicators of aquatic integrity.

Part two focused on 18 of the 39 narrowly-distributed endemic or sensitive taxa that were identified in Lee and others (in press) (table 3.1). Some of these species are federally listed under the Endangered Species Act of 1973 (ESA). Whether listed or not, we omitted from analysis those taxa that do not occur in more than one National Forest or BLM District, since they are better addressed by the individual administrative units. We also omitted species for which Federal land management has little or no perceived influence on their viability.

We did not assess viability of desirable introduced species because the distribution of introduced species tends to be irregular. Viability is more of a local issue that applies to individual populations within small areas. It is not a broad-scale issue, and there is little for our analysis to contribute. Introduced species tend to persist wherever humans choose to stock them.

Information on non-fish, aquatic organisms and pertinent aspects of aquatic systems is limited, and is often specific to an individual site. Many aquatic invertebrates have very localized distributions, making effects of watershed-scale disturbance difficult to detect. For these reasons, we decided it was inappropriate to address the non-fish, aquatic biota in a broad-scale evaluation of alternatives.

[2]The Basin is defined a those portions of the Columbia River basin inside the United States east of the crest of the Cascades and those porions of the Klamath River basin and the Great Basin in Oregon.

Table 3.1. Rare and sensitive fish taxa in the Interior Columbia Basin Ecosystem Management Project (ICBEMP) analysis areas. This list excludes seven widely-distributed salmonids that were focal species in the Aquatics chapter of the *Assessment of Ecosystem Components.*[1] Viability analyses will be conducted only on those 18 taxa occurring in more than one BLM/Forest Service jurisdiction and affected by land management activities.

ICBEMP Sensitive Fish Species	Occur in more than one BLM/FS jurisdiction?	Affected by land management?	Viability analysis?
White sturgeon	Yes	No	No
Klamath lamprey	No	No	No
River lamprey	Yes	No	No
Pacific lamprey	Yes	Yes	Yes
Goose Lake lamprey	No	Yes	No
Pit-Klamath brook lamprey	Yes	Yes	Yes
Sockeye salmon	Yes	No	No
Chum salmon	Yes	No	No
Coho salmon	Yes	No	No
Coastal cutthroat trout	No	Yes	No
Lahontan cutthroat trout	Yes	Yes	Yes
Pygmy whitefish	Yes	Yes	Yes
Burbot	Yes	No	No
Sand roller	Yes	No	No
Northern roach	No	Yes	No
Alvord chub	No	Yes	No
Borax Lake chub	No	Yes	No
Catlow tui chub	No	Yes	No
Oregon Lakes tui chub	Yes	Yes	Yes
Summer Basin tui chub	No	Yes	No
Sheldon tui chub	No	Yes	No
Hutton tui chub	No	Yes	No
Leatherside chub	Yes	Yes	Yes
Foskett speckled dace	No	Yes	No
Lost River sucker	Yes	Yes	Yes
Warner sucker	Yes	Yes	Yes
Goose Lake sucker	Yes	Yes	Yes
Shortnose sucker	Yes	Yes	Yes
Klamath largescale sucker	Yes	Yes	Yes
Wood River bridgelip sucker	Yes	Yes	Yes
Torrent sculpin	Yes	Yes	Yes
Shorthead sculpin	Yes	Yes	Yes
Pit sculpin	No	Yes	No
Slender sculpin	Yes	Yes	Yes
Margined sculpin	Yes	Yes	Yes
Wood River sculpin	Yes	Yes	Yes
Shoshone sculpin	No	No	No
Malheur sculpin	Yes	Yes	Yes
Sunapee char	No	No	No

[1]Lee, D.C.; Sedell, J.R.; Rieman, B.; [and others]. (in press). Chapter 4. Broadscale assessment of aquatic species and habitats. In: Quigley, Thomas M.; Arbelbide, S.J., tech. eds. An assessment of ecosystem components in the interior Columbia Basin and portions of the Klamath and Great basins. Gen. Tech. Rep. PNW-GTR-XXX. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station; (Quigley, Thomas M., tech. ed. The Interior Columbia Basin Ecosystem Management Project: scientific assessment).

Step 1: Suitability of Proposed Alternatives for Aquatic Ecosystem Protection

The major elements of the aquatic conservation strategy were evaluated on the basis of interim widths of riparian areas and activities allowed within them, treatment of strongholds and "at-risk" populations, treatment of priority watershed or aquatic categories, amount of watershed and riparian restoration, and major assumptions needed to determine successful outcomes.

Riparian Widths and Activities

Current forest plans and forest practice rules regulate two major features of Riparian Habitat Conservation Areas (RHCA) used in Alternatives 2, 3, and 7 and Riparian Management Areas (RMA) used in Alternatives 4, 6, and parts of Alternative 5: their width and the type and amount of activities permitted to take place within them. Evaluating the effectiveness of RHCAs and RMAs to protect and manage riparian areas is difficult because of the complexity of the ecological functions they provide, the extended time over which impacts can occur, and the often long duration it can take for ecosystems to recover. Four biophysical principles underlie any evaluation of a riparian management strategy: (1) the functions and processes that govern production in a stream are generally dependent on predictable and near-natural energy and nutrient inputs; (2) wildlife has a disproportionally high use of riparian areas and stream-side forests compared with the overall landscape; (3) small streams are generally more affected by hill-slope activities than are larger streams; and (4) as adjacent slopes become steeper, the likelihood of disturbance resulting in discernable instream effects increases.

The width necessary to protect stream and riparian area structure and function at the small watershed level, and limits to disturbance near streams, will necessarily be based on watershed and site-specific analysis. The dimensions of riparian protection areas, particularly if they are to be used as interim or default standards, could include safety factors to allow for natural disturbances, uncertainties about the riparian ecosystem of interest, and changes in public values (National Research Council 1995). If an additional margin of error is allowed (not unlike bridge design accounting for unknown factors and longevity of structure), the probability of habitat improvement becomes greater and options for future management decisions are increased (FEMAT 1993, National Research Council 1995).

Channelized flow from intermittent and small streams into fish-bearing streams is a primary source of sediment in mountainous regions (Belt and others 1992). Gray (1970, 1978) identified four mechanisms by which vegetation enhances soil stability including: (1) mechanical reinforcement by roots; (2) regulation of soil moisture content; (3) buttressing between trunks or stems of plants; and (4) surcharge from the weight of trees. Gray and Megahan (1981) evaluated these hydromechanical effects in the Idaho batholith and found that the first three are highly important in stabilizing slopes, hollows, and intermittent streams. Gray and Megahan (1981) recommended using buffer zones along the margins of streams, and establishment of vegetative-leave-areas in critical areas, such as hollows and intermittent streams. Further, the assumption that large woody debris (LWD) recruitment in streams comes only from adjacent stream banks is not warranted given that intermittent streams provide large quantities of LWD during floods, after fires, and from debris torrents (Reeves and others 1995). Many of these small intermittent streams will not have full protection of ecological functions without an adequate RMA (Erman and Mahoney 1983, McGurk and Fong 1995).

The riparian goals and objectives of Alternatives 2 through 7, with the exception of the commodity-emphasis areas of Alternative 5, are to protect and restore riparian functions. The actual size of the riparian areas depends on the local characteristics that define them and a clear vision of how to

achieve the riparian management goals and objectives. Some of the goals of the aquatic conservation strategy for an alternative are to maintain the function of instream processes over the life of the plan and several additional decades. With the exception of current forest plans (Alternative 1) and the commodity-emphasis areas of Alternative 5, the alternatives utilize one-half to two maximum site potential tree heights[3] (90 ft or 27.4 m for cold forest, 120 ft or 36.6 m for dry forest, and 150 ft or 45.7 m for moist forest) depending on stream size, plus the flood-prone (11-year floodplain) area or the 100-year floodplain, whichever is greater, as a standard for defining riparian widths.

Conservatively managed RHCAs and RMAs of one maximum site potential tree height are likely adequate to maintain most key riparian functions (for example, stream shading, large woody debris recruitment, small organic litter inputs, and nutrient regulation) throughout several decades or 100 years. The width dimensions of RHCAs and RMAs in Pacific Anadromous Fish Strategy (PACFISH 1994) (Alternative 2) and the deviation from PACFISH in Alternatives 3, 4, 6, 7, and parts of Alternative 5 in general provide adequate protection and a margin for error for riparian processes critical for maintaining fish species in most instances (FEMAT 1993; Lee and others, in press; Murphy 1995; National Research Council 1995; PACFISH 1995). Alternatives 2, 3, and 7 use site potential tree height, 100-year floodplain width, or a specified distance (50-300 ft or 15.2-91.5 m depending on whether the stream is fish-bearing and intermittent or permanently flowing). Alternatives 4 and 6 use the same site potential tree height standards as Alternatives 2, 3, and 7 with a minimum of 90 feet (27.4 m) for cold forest intermittent streams, to 300 feet or 91.5 meters (2 tree heights) for larger fish-bearing streams in moist forests. The width is dependent on potential vegetation type or one tree height to two tree heights. In addition, the RMAs for Alternatives 4 and 6 can vary depending on the steepness of the adjacent slope; larger riparian widths are defined where steep slope influences occur. Generally, for slopes greater than 30 percent, RMAs will be wider than 300 feet (91.5 m).

Alternative 1 and the commodity-emphasis areas of Alternative 5 do not adequately protect riparian functions for several reasons. The existing forest plans (Alternative 1) are highly variable in providing riparian protection. They frequently provide no protection for intermittent streams, and generally do not fully protect riparian dependent functions (Lee and others, in press; Murphy 1995; PACFISH 1995). In Alternative 5 timber and livestock emphasis areas, which encompass nearly all of eastern Oregon and the northern third of the UCRB area, RMA widths vary from 20 feet (6.1 m), to a maximum of one site potential tree height, depending on the individual function or combined functions that require protection. RMA widths are the same as Alternatives 4 and 6 in non-timber or livestock emphasis areas of the Basin. While ecological functions of riparian areas would be protected under Alternative 5, the alternative does not provide enough information to evaluate whether a minimum or maximum width would be used. The maximum width of one site potential tree height leaves little margin for uncertainty, and less than one site potential tree height would not provide full, direct ecological protection or have the possibility to provide for other organisms with greater habitat requirements. The variable widths of riparian areas suggest a one-size-fits-all approach of a maximum of one site potential tree height will not accommodate all organisms (PACFISH 1995). PACFISH (1995) prescribed 90 meters (295 ft) minimum RHCA widths for fish-bearing streams to maintain stream function from non-channelized source sediment inputs. A review of the literature indicates that the minimum widths recommended by PACFISH would also be sufficient to provide for other riparian functions with a margin for error (Belt and

[3]Site potential tree height is defined as "the average maximum height of the tallest dominant trees (200 years or more) for a given site class."

others 1992; Beschta and others 1987; Brazier and Brown 1973; Gregory and others 1987; Lee and others, in press; McDade and others 1990; National Research Council 1995; Sedell and Beschta 1991; Steinblums and others 1984).

There is no provision in commodity-emphasis areas under Alternative 5 for protecting intermittent streams from which many disturbances originate (such as, landslides, sediment entry, and woody debris recruitment; Belt and others 1992). In addition, the watershed analysis procedure for the commodity-emphasis areas under Alternative 5 is concerned primarily with hydrologic and geomorphic functions, and not ecosystem functions of the landscape. In commodity-emphasis areas under Alternative 5, only site-specific analysis is required at the project scale, making it difficult to determine cumulative effects at a watershed level.

A major assumption made under Alternatives 4, 5, and 6 is that active management of RMAs is necessary to reduce fire severity. This would be accomplished by recreating a mosaic of stands in different conditions that offer natural firebreaks and less concentrated food sources for pests, mimicking historical forest conditions. The trade-off between fire risk and the risks associated with management activities is a watershed and site-specific issue, and no clear direction is given for the reconciliation of competing ecological needs in the preliminary draft EIS standards and guidelines (see appendix I, Vol. II). While productivity and fuel loading may be highest in the RMAs, these zones are generally moister and historically had longer fire return intervals (Agee 1994). Thus, in an ecological sense, fire management concerns are generally not a primary emphasis in riparian zones. Although riparian corridors sometimes experienced high-intensity fires, the more typical fire pattern was high-intensity fires that burned down to the riparian corridors, decreased in intensity, and often went out (Agee 1994). Given the importance of the riparian area to fish and aquatic habitat, a prudent course of treatment benefiting both RMAs and the entire landscape might be to treat the fire-prone portions of the landscape outside of riparian areas. By focusing treatment in areas adjacent to riparian zones, historical refuges within the RMAs would be protected, where activities occurring closer to the stream have a greater probability for adverse effects on the stream. Although break up of current continuity of fuels is a needed treatment over much of the landscape, little is known about the minimum threshold of treatment that would sufficiently reduce fuel loadings and thereby reduce the potential for and frequency of major catastrophic fire. Historically, almost all of the low-severity fire regimes were in a mosaic, "fire-safe" condition (Agee 1994). If the upland landscape can be restored to a more sustainable character through thinning and prescribed burning, wildfires can be largely controlled before they burn riparian zones.

For the purposes of this evaluation, we assumed that the large tree standard contained in the interim RMA objectives and standards for Alternatives 4, 5, and 6 (see appendix I) takes precedence over the fire regime and fire-severity standards applied directly to riparian zones. In other words, if in a dry forest type the RMAs were mostly composed of mixed-age firs, then the big firs would generally be of high ecological value and be in short supply along streams and the RMAs would meet the silviculture standard for mature or late-successional stage in zone 1. Thinning, from below (removing the smaller, younger, understory trees), would achieve the desired fire management goals (reducing fuel ladders) while also meeting the large tree standards near streams; this is different from converting the entire area to a dry forest composition.

Treatment of Strong and At-Risk Populations

Alternatives 3 through 6 do not specifically provide a mechanism for recognizing at-risk or critical habitats within subbasins other than those that require watershed/ecosystem analysis. Although conservation/restoration of strongholds for key salmonids is an important and logical priority, recognition and prioritization of other habitats

that support depressed populations of sensitive or narrowly-distributed species is also important in order to restore the condition of aquatic ecosystems.

We could not identify any scheme for prioritizing restoration activities in important but at-risk subwatersheds. For example, because the fringe distributions of several of the key salmonids are represented only by depressed populations and are not in Category 1 watersheds,[4] they would not require watershed analysis. There appears to be no mechanism in any of the alternatives outside of the intent to consider watersheds at risk. In guideline A-G26 (Aquatics-Guideline 26; see appendix I), it is suggested that managers (when prioritizing watershed restoration activities) consider threatened and endangered species, important life histories, and riparian dependent species. We assumed that there was no mechanism to prioritize protection of important and at-risk habitats or populations (such as depressed populations found in the fringe distributions) if they did not coincide with strong, Category 1, or priority watersheds. This may be particularly significant for the fringe distributions of several species. Although fringe areas may contribute a disproportionately large part of the genetic diversity or variability for some species, they are generally composed of depressed populations that are not considered under the strategies associated with any alternative.

Treatment of Priority Watersheds and Category Watersheds

Priority watersheds in Alternative 2 are replaced by watershed Categories 1[4], 2[5], and 3[6] in Alternatives 3 through 6. Although the ecosystem management alternatives require a mid-level (subbasin) analysis, the discussion does not clearly acknowledge the uncertainty and limited utility of the aquatic classification scheme. The classifications were intended to communicate broad-scale issues and opportunities regarding conservation and restoration potential of aquatic ecosystems, not to develop a prescription (Lee and others, in press). They are based on coarse data that have not been verified. Examination of new and finer-level information would likely result in many modifications. A process for designating water-

[4]Category 1 Watershed: These high integrity subbasins most closely resemble natural, fully functional aquatic ecosystems. In general they support large, often continuous blocks of high-quality habitat and watersheds with strong populations of multiple species. Connectivity among watersheds and through the mainstem river corridor is unimpeded, and all life histories, including migratory forms, are present and important. Native species predominate, though introduced species may be present. These subbasins provide a system of large, well-dispersed habitats resilient to large-scale disturbances. They provide the best opportunity for long-term persistence of native aquatic assemblages and may be important sources for refounding other areas.

[5]Category 2 Watershed: These moderate integrity subbasins support important aquatic resources, and often have watersheds classified as strongholds for one or more species scattered throughout. The integrity of the fish assemblage is high or moderate. The most important difference between Category 1 and Category 2 watersheds is increased fragmentation in Category 2 that has resulted from habitat disruption or loss. These subbasins have numerous watersheds where native species have been lost or are at risk. Connectivity among watersheds exists through the mainstem river system, or has the potential for restoration of life-history patterns and dispersal among watersheds. Because these subbasins commonly fall in some of the more intensively managed landscapes, they may have extensive road networks. Stronghold watersheds that require conservative protection are scattered rather than contiguous. These subbasins are more likely to provide opportunities to explore or experiment with watershed restoration through active manipulation, or through attempts to produce more episodic disturbance followed by long periods of recovery.

[6]Category 3 Watershed: These low integrity subbasins may support populations of key salmonids or have other important aquatic values, such as threatened and endangered species, narrow endemics, and introduced or hatchery supported sport fisheries. In general, however, these watersheds are strongly fragmented by extensive habitat loss or disruption throughout the component watersheds, and most notably through disruption of the mainstem corridor. Major portions of these subbasins are often associated with private and agricultural lands not managed by Forest Service or BLM. Although important and unique aquatic resources exist, they are usually localized. Opportunities for restoring connectivity among watersheds, full expression of life histories, or other large-scale characteristics of fully functioning and resilient aquatic ecosystems are limited or nonexistent in the near future. Because the remaining aquatic resources are often strongly isolated, risks of local extinction may be high. Conservation of the remaining productive areas may require a disproportionate contribution from federal management agencies, because these subbasins often include large areas of non-Federal land.

shed categories that can be amended through mid-level analysis, however, is not provided. In our evaluation we assumed that strongholds can be identified and verified with subbasin analysis. We also assumed that aquatic classification can be amended and verified as well.

Land Use and Management Activities

We assumed that harvest and thinning activities have potentially negative net effects on aquatic systems, and that prescribed burning, livestock management, watershed restoration, and riparian restoration have potentially positive net effects. We recognize that these generalizations are not true in all situations and within all subbasins. Effects of timber harvesting and thinning are difficult to determine at the broad scale. However, with the exception of helicopter logging, most timber harvest activities have an ecological downside and higher risk potentials. This risk potential stems from additional road, landing, and skid trail soil compaction. Megahan and others (1992) concluded that new Best Management Practices (BMPs) can reduce sediment yields compared to historical practices, but risks of increased sedimentation from forest management practices will continue to occur if road building and timber harvesting take place. Menning and others (1996) adapted a cumulative watershed effects accounting system to model forest stand response to fire and timber harvest activities. Their coefficients for different types of wildfires, timber harvest, grazing activities, and roads reflect the relative associated risk to watersheds from sedimentation and are consistent with our assumptions.

We assumed that prescribed burning would not require new roads or activities to effectively treat the landscape and would result in no soil compaction. In reviewing literature on watersheds from the western United States, Beschta (1990) concluded that where low-severity burns occur (as with prescribed burning), much of the organic matter comprising the forest floor may remain following burning. In these situations, the effects of burning are generally insignificant with regard to a wide range of hydrologic and water quality variables.

Restoration may include a variety of activities that influence aquatic habitats, but it is not possible to determine the relative significance of those activities from their allocation in the alternatives. Because restoration activities or the levels of those activities are not clearly defined, we assumed that restoration means significant progress in the restoration of the processes and functions relevant to aquatic habitats and species in the treatment area. We generally assumed that more restoration was better, and that moderate and high levels of restoration in terms of acres or hectares treated per decade (see "Major Assumptions and Information Used to Judge Alternatives" section later in this chapter) would produce positive trends in the status and distribution of a species. This assumption would hold true as long as those activities were subsequent to watershed/ecosystem analysis and were distributed across a portion of the species' range where they would be beneficial (for instance, where the species is still present and capable of responding). We also recognized that some risk is inherent in all forest management and restoration activities, and assumed that high restoration alternatives would be pursued with an approach that maximizes learning while minimizing risks.

Major Assumptions Needed to Determine Successful Evaluation Outcomes

As established in the preliminary draft EISs, standards represent required actions, and guidelines are suggestions for achieving objectives and are not required actions (see appendix I for details). Because we could not anticipate when guidelines would or would not be followed, our analyses represent the outcomes associated with the situation where they would generally not be followed. We recognized that in some circumstances and in some areas, guidelines would be implemented. Many of the standards and guidelines in the interim RMAs appeared decoupled from the aquatic conservation objectives. They referred to meeting

Riparian Management Objectives (RMOs) and protecting RMAs but did not refer back to the ecological objectives. We further assumed in our analysis that the interim standards would become final or long-term standards, since there was no time period specified for analyzing watersheds and the outcome of watershed analysis is unknown.

Ecosystem management standards

In Alternatives 3 through 7, ecosystem management planning is emphasized. As such, we assumed that it would be completed or there would be greater difficulty and uncertainty surrounding the management of landscapes and cumulative effects. Our assumptions regarding several important standards in the ecosystem management section of the preliminary draft EISs (see appendix I) are as follows:

- EM-S12[7] (Develop and implement a standardized road condition and risk inventory.) We assumed that it would be done within the first one to two years or that the guideline for effective watershed restoration (a key element in our evaluation) would be uncertain and the intent of Alternatives 3 through 7 would not be met.
- EM-S13 (Construct new road crossings to maintain fish passage.) We assumed an ecosystem management standard requires maintaining hydrologic processes not just fish passages. As such, the road's management standard in the Aquatic Strategies Interim Objectives and Standards section of the preliminary draft EISs was assumed, specifically in areas where new stream crossings would accommodate a 100-year flood.
- EM-S14 (Transportation plans should be developed in an integrated resource manner, supporting ecosystem analysis and prioritizing roads for rehabilitation, closure, or obliteration.) We assumed it would be done in the same timeframe or parallel to the above-mentioned Standard EM-S12.
- EM-S15 (There shall be no net increase in road density in any cluster. Road mileage increases will be offset by an equal or greater mileage decrease on a per cluster basis.) Subwatersheds [6th hydrologic unit code (HUC)] through subbasins (4th HUC) are the appropriate scales to relate the ecological and cumulative effects consistent with the ecosystem analysis requirements presented in Alternatives 3 through 7. This is the only place where a cluster is assigned a specific implementation requirement as opposed to a strategic basin view. We assumed that there was an ecological basis for reducing moderate- to high-density roaded watersheds, but there was no equal ecological basis for trading road reduction in these areas for more roads in very low-density or unroaded watersheds. Thus, we assumed that a reduction in roads in high-density areas would not offset the negative effects of increasing roads in low or unroaded areas.
- EM-S16[8] (Use adaptive management.) In order for there to be an effective adaptive management program, we assumed that resources would be allocated and priorities established, so that road inventories, watershed analysis, and design and implementation of inventory and monitoring programs would be in place within a two-year timeframe.

Aquatic strategies standards

Watershed and riparian restoration management:

- A-S3[9] (Attainment and process for assessing Proper Functioning Condition should be

[7]EM-S12 indicates Ecosystem Management - Standard, followed by the specific standard number cited (Chapter 3, Preliminary Draft EISs) (USDA and USDI 1996a, 1996b).

[8]EM-S16 indicates Ecosystem Management - Standard 15; Standard 15 was added to this evaluation of alternatives at a later date than the other standards cited in this discussion and is therefore found in the August 1996 version of the Draft EIS.

[9]A-S3 indicates Aquatics - Standard, followed by the specific standard cited (Chapter 3, Preliminary Draft EISs) (USDA and USDI 1996a, 1996b).

required.) We assumed the attainment of proper functioning condition (PFC) would be required and that if it were not, management activities would be modified to attain PFC. The PFC concept is an example of a poorly-defined condition that is directed to be met, but for which the preliminary draft EISs do not address the ecological elements directly or specifically. We have assumed that PFC addresses both the hydrologic and geomorphic aspects of channels, stream banks, and surface water as well as the vegetative characteristics. Further, we have assumed that PFC achieves hydrologic function first and that the manager's decision-making options are between achieving hydrologic function and attaining site-specific vegetation potential. For purposes of aquatic and terrestrial organism communities, we assumed that vegetation standards are specifically included. Conservation and restoration of PFC in riparian areas includes managing toward an advanced successional stage of riparian vegetation with multiple species and age classes of woody vegetation. This is ecologically necessary. We further assume that PFC is an interdisciplinary team process; similar to watershed analysis, it will likely require more than one person to complete the analysis.

The PACFISH Recommended Livestock Grazing Guidelines[10] lists specific attributes of PFC, recommendations for modifying current directions, and priorities for taking action. The specificity of the guidelines provides a credible basis for evaluating and monitoring, and increases their ability for implementation.

Monitoring and inventory:

- A-S7 (Regional and State offices shall develop monitoring frameworks.) We assumed a monitoring program would be developed.
- A-S8 (Regional and State offices should oversee, ensure, and report results of monitoring programs.) We assumed regional and state offices would oversee and ensure monitoring programs and report their results.
- A-S10 (Monitoring shall be conducted to determine if objectives are being met...If analysis indicates that Watershed or Riparian Management Objectives are not being met due to natural conditions or to processes or action outside of management control, then new objectives should be developed on the basis of new information.) We thought that this was a standard that implied a cumulative watershed effects (CWE) analysis. Currently only the Aquatics Guideline A-G25 directly addresses CWE: "Consider establishing qualitative and quantitative watershed disturbance (natural and management) levels or parameters for upland and riparian area zones to provide early indication of potential watershed cumulative effects and causal mechanisms for aquatic and riparian conditions." Alternative 7 is the only alternative that directly addresses CWE by calling for a consistent equivalent clearcut area (ECA) CWE method and setting a 15 percent ECA threshold which would trigger a watershed analysis (McCammon 1993). This threshold is at a watershed scale and does not distinguish near-stream disturbances from upslope disturbances or set a lower threshold near streams than for upslope areas. Alternatives 4 and 6 put forward a riparian zoning scheme which sets the foundation for CWE determination that could be sensitive to spatial variations in considering watershed disturbing effects (McGurk and Fong 1995, Menning and others 1996). However, only the vegetation management was directly required as a standard (directing more riparian forests toward mature and old forest condi-

[10]Personal communication. May 24, 1995 [revised July 31, 1995]. John Lowe, U.S. Forest Service. Internal document on file with: U.S. Department of Agriculture, Forest Service, U.S. Department of Interior, Bureau of Land Management, Interior Columbia Basin Ecosystem Management Project, 112 E. Poplar, Walla Walla, WA. 99362.

tions). Developing disturbance limitation criteria for each zone within the first couple of years of a plan would help prorate CWE and spatially locate these away from streams. All of the alternatives would provide greater protection for aquatic systems if they had such criteria. Such a scheme would allow more creative solutions and proposed new activities to be developed for currently disturbed watersheds, because planning models could be used before implementation of a project as opposed to instream RMOs which are an after-the-project measure of past events.

Key watersheds and watershed categories:

- A-S12 (Ecosystem analysis should be performed in Category 2 and 3 watersheds before Environmental Assessment (EA) or EIS required activities, otherwise interims apply.) We assumed ecosystem analysis would be conducted in strongholds and high-priority watersheds in Category 2 and 3 watersheds for Alternatives 3, 4, parts of Alternative 5, and 6.

Non-Federal Lands

No alternative addressed the role of non-Federal lands in achieving the goals and objectives of the aquatic conservation strategy. In assessing the role of non-Federal land in the maintenance of fish habitat and water quality, we assumed that the federally managed lands would likely act as anchors, and that, as important as non-Federal land is to certain fishes and aquatic communities, improvements would not be systematic throughout the Basin and conditions would not likely improve substantially. We based this assumption on the following reasons: (1) the goals of the states' natural resource agencies generally are not specifically aimed at restoring aquatic ecosystems and biodiversity, but instead are aimed at meeting societal needs while disrupting ecological processes and structures as little as possible; (2) as one moves from the broad and uniform application of forest practice rules, which are themselves not fully protective of riparian function (FEMAT 1993, Murphy 1995, National Research Council 1995, Spence and others 1996) to rangelands and then to settlement areas at the urban/wildland interface, the outcomes of regulations and laws are variable, localized and often vague; and (3) adequate information about species in a site that will be affected by management activity is generally lacking, especially in terms of the biological condition and presence of rare species. While each State within the Basin has goals associated with their policies, the actual implementation of those goals through adherence to the requirements embodied in the standards remains less certain. For these reasons, we assumed the outcomes were highly uncertain and problematic for such policies to protect and restore riparian and aquatic resources through time. Private lands affect corridors, low- to mid-elevation watersheds, valleys, and meadows. All of these are important to different aquatic communities and to water quality. Private land ownership patterns afford Federal managers the opportunity to cooperate in maintaining and restoring of aquatic resources or to become more conservative to accommodate continued effects within the subbasins and the Basin.

Summary and Comparison

All of the alternatives lack specific performance measures. Performance measures would be quantifiable ecological goals in the sense that they measure a biological or physical process or state (such as, water quality and instream RMOs); they are not a measure of causal mechanisms. These would be measures from which one could determine the desired future conditions of the stream, watershed, or riparian vegetation. We do not view these performance measures as absolute thresholds or targets, but rather in the sense of relative health of the system, much like foresters view measures of mortality, growth rate, and so on. If the overall goal is to maintain and/or restore natural ecosystem processes and conditions, then some performance measures are needed that can be used to indicate if the current trend is moving in the desired direction. For example, the science literature supports that more ecological functions

and habitats along forest streams can be provided if the adjacent stand is in a mature or late-successional condition (FEMAT 1993, Murphy 1995, National Research Council 1995). Measures of this condition are the number and size classes of large trees for a given potential vegetation group (PVG). If this condition exists or could be attained, one could expect the instream conditions to eventually reflect the desired instream conditions. Likewise, with limits on disturbance in watersheds, the desired state could be maintained or potentially restored in a shorter period of time than if there were or had been no limits to watershed disturbance.

The instream RMOs are an attempt to quantitatively provide a measure of the current condition of a stream or streambank. They reflect causal mechanisms occurring recently or in the distant past. Changes in these measurable instream characteristics could be a result of decades of past degradation, a recent large flood, human disturbance, or multiple causes. In aggregate, RMOs are useful in determining trends and current watershed conditions, but are not well connected to planning and implementing ecosystem management within these alternatives.

Under Alternatives 2 through 6, RMO objectives are not expected to be met instantaneously, but rather would be achieved over time. While the RMOs vary somewhat, the timeframe for attainment of RMOs does not appear to vary with alternative except when concerning watershed restoration activity levels. This reduces our ability to use RMOs to evaluate their effectiveness within each alternative. In Alternatives 4 and 6, "all of the described features may not occur within a watershed, but all generally should occur at the watershed scale." We were given no guidance in any alternative as to how the condition of a watershed relative to RMOs would affect project implementation. If RMOs are below standard for the watershed, do projects continue that can further degrade habitat? We assumed not. We further assumed that if watershed analysis allowed one to make changes in standards and guidelines in Alternatives 3, 4, 6, and parts of Alternative 5, such changes would not result in degradation or halt restoration trends for habitats, populations, or riparian conditions.

The alternatives are very complex and do not vary systemically to allow a marginal evaluation of the effectiveness of their components. We were often required to evaluate them on the stated alternative approach rather than on the specific elements of an alternative. For example, the real difference between Alternatives 4 and 6 is that they will be implemented at different rates and that adaptive management will figure more prominently in Alternative 6. The difference between Alternatives 2 and 3 appears to be the immediate incorporation of new information gained through the science assessment.

In summary, five of seven alternatives articulated an aquatic conservation strategy sufficient to maintain and restore aquatic and riparian ecological processes through time (table 3.2), Alternative 7 gave the most direct and specific direction regarding performance measures coupled with its reserves and its passive approach. Alternative 6 with its emphasis on adaptive management and cautious approach and Alternative 4 with its aggressive restoration, had less-specific descriptions of processes and performance measures, but RMAs were to be slope adjusted. Alternatives 2 and 3, with the ability to change widths of RHCAs and RMOs with site-specific (not watershed-specific) analysis, rated lower. Finally, Alternatives 1 and 5 did not rate as ecologically satisfactory in their ability to meet the goals and objectives of the aquatic conservation strategy.

Table 3.2. Suitability of proposed alternatives for aquatic ecosystem protection.

Evaluation Questions	Alternative						
	1	2	3	4	5	6	7
Does the aquatic conservation strategy maintain and restore aquatic and riparian ecological processes through time?	No	Yes	Yes	Yes	Yes, in non-production emphasis areas No, in production emphasis areas	Yes	Yes
Is watershed or ecosystem analysis required for specifically identified watersheds?	No, except in FEMAT[1] key watersheds	Yes, but is site-specific, not ecosystem-specific except in FEMAT[1] key watersheds	Yes, but is site-specific, not ecosystem-specific except in FEMAT[1] key watersheds	Yes, watershed analysis in Category 1 and all strongholds, ecosystem analysis in high-priority watersheds and FEMAT[1] key watersheds	Yes, ecosystem analysis in Category 1 non-production emphasis areas; No, in production emphasis areas except FEMAT[1] key watersheds	Yes, watershed analysis in Category 1 and all strongholds, ecosystem analysis in high-priority watersheds and FEMAT[1] key watersheds	Yes, watershed analysis in high-priority watersheds, 1,000 acre roadless areas, and FEMAT[1] key watersheds
Can standards and guidelines be modified after ecosystem analysis?	Highly variable, No	No	Yes	Yes	Yes, in non-production emphasis areas; No, in production emphasis areas	Yes	No
What are the relative benefits of the proposed intensity of riparian and watershed restoration (road obliteration)?	Low	Moderate	Moderate	High	Moderate	High	Low-Moderate

[1]Forest Ecosystem Management Assessment Team (FEMAT). 1993. Forest ecosystem management: an ecological, economic, and social assessment. Portland, OR: U.S. Department of Agriculture; U.S. Department of Interior [and others]. [irregular pagination].

Step 2: Projected Effects on Widely-Distributed Salmonid Species

The "Broadscale Assessment of Aquatic Species and Habitats" (Lee and others, in press) identified seven widely-distributed salmonids that serve as indicators of environmental change. These seven key salmonids are bull trout, westslope cutthroat trout, Yellowstone cutthroat trout, redband trout, steelhead, ocean-type chinook salmon, and stream-type chinook salmon. In this exercise, we identified the expected effect of the seven alternatives on future distribution and status of each of these salmonids.

Major Assumptions and Information Used to Judge Alternatives

We followed the general assumptions identified by the SIT for evaluating alternatives.[11] Specific to salmonids, we assumed that during implementation of the alternatives the presence or absence of strong populations (strongholds), as defined by the SIT in Lee and others (in press), would be verified using local information when activity levels depended on such strongholds. For the purpose of our evaluation, however, we used known and projected status maps (Lee and others, in press) as a reasonable estimate of the current distribution and abundance of strongholds. In our analysis we relied strongly on the information regarding the distribution and status of fishes generated by the aquatic assessment (Lee and others, in press). We also used the spatial and temporal allocation of management activities and road densities developed in the preliminary draft EISs to describe the patterns of management with the potential to influence fishes under each of the alternatives. We developed four primary pieces of information as follows: (1) a series of classification trees to describe current patterns in fish distribution associated with landscape characteristics and to predict simple trends in distribution associated with changes in those characteristics, (2) a summary of anticipated road density changes across the current distribution of fishes, (3) a summary of the current ownership and management cluster for the current distribution of fishes, and (4) a summary of the anticipated intensity of management activities across the current distribution of fishes. Each informational piece provided some sense of where and how much of the anticipated management change was likely to influence each of the species we considered. Each has important limitations or inconsistencies and represents only a single element in a larger and more complex picture. Any conclusions must be drawn from the weight and consistency of trends anticipated from the models, from the patterns in allocation of roads and other land-disturbing activities, the allocation of restoration activities, and the mitigation of disturbance expected through the standards and specific direction of the alternatives.

Classification trees—In order to help track changes in population distribution and status that might result from each alternative, we developed a series of classification trees that linked population status of each species to physical landscape features and management activities. We followed the approach of Lee and others (in press), except that we used a smaller subset of landscape variables to describe the physical setting, and additional measures of road density that were calculated from the one-square-kilometer (0.39 mi^2) road-density data summarized for each subwatershed [8,000-20,000 acre (3,239-8,097 ha) watersheds, 6th HUC] (appendix 3-B). The resulting classification trees' probability distributions associated with each node are presented in appendix 3-B. Uncertainty in classifications can be evaluated through classifi-

[11]Personal communication. March 15, 1996. Sylvia J. Arbelbide, Minerals Area Management Director, U.S. Forest Service, Pacific Southwest Region, San Francisco, CA. Memo, on file with: U.S. Department of Agriculture, Forest Service, U.S. Department of Interior, Bureau of Land Management, Interior Columbia Basin Ecosystem Management Project, 112 E. Poplar, Walla Walla, WA 99362.

cation success tables (see Lee and others, in press). However, because we used the existing patterns of occurrence as estimates of the likelihood for a given species occurrence under similar conditions in the future, classification success is irrelevant. Confidence intervals for the proportions could be estimated but generally would be comparable in magnitude to the estimated change in distribution. We did not conclude, therefore, that significant changes are likely or unlikely based only on these simple models; we merely used them as an indication of the trends that would be consistent with changes in allocation of roads. The development and utility of classification trees with these data are covered in detail in Lee and others (in press).

The resultant classification trees consistently showed that the likelihood of a strong population decreased with increasing road density in many portions of the landscape for all of the resident species. We used classification trees to predict the likelihood of strong populations and/or depressed populations for each alternative, using the projected road densities in year 100. With the models, we predicted a range of responses that were interpreted for each species by comparison with the current condition. For example, Yellowstone cutthroat trout are currently classified as strong in about 34 percent (Alternative 0 = 0.341 = 34%) of the subwatersheds within the potential historical range (table 3.3). Under Alternative 1, the probability assignment was 0.325 or a change of -0.016 suggesting a declining trend in the occurrence of strong subwatersheds. The predicted loss represents about 4.7 percent of the current distribution of strong subwatersheds across the assessment area. The results also suggest a negative but less substantial change (0.9% of current) in the combined distribution (strong and depressed) for this subspecies (table 3.3).

From these results we could anticipate negative trends in both the status and complete distribution of Yellowstone cutthroat trout associated with the distribution of roads. We might further anticipate a larger change in status than in overall distribution. In other words, the changes from strong to depressed are more likely to occur than are changes from present to absent. Because the models were based on fish distributions and road density allocations by subwatershed, the predictions could also be summarized by subbasin (table 3.4) to provide a spatially explicit characterization of the anticipated changes. In this example, larger changes in status of subwatersheds should be expected in the Salt subbasin than in the Teton subbasin although both show a negative trend (table 3.4). This information was summarized by species and subbasin in a series of tables (tables 3.3-3.10) that were made available to the evaluation team.

The effects of increasing road densities include more than simply the total number of roads; there often are attendant landscape effects associated with roads which cannot be directly measured or projected (Lee and others, in press). Thus, we used road density as a general indicator of human disturbance. One could develop protracted arguments that future roads will not be as harmful as historical roads, or alternatively, that removing roads is not as favorable as having never built them at all—all of which makes evaluating future effects of roads problematic. To simplify, we assumed that future distributions of fish would be influenced by road-density patterns consistent with current relationships unless clearly mitigated by management. Therefore, the predicted changes in probability assignments from the classification trees are useful measures of relative changes that are based on empirical patterns.

Whether or not projected roads and their related effects will influence the status of fishes must be drawn from these empirical patterns, an understanding of the limitations, and the likely mitigative or exacerbating effects of each alternative. It is important to emphasize this point. Changes in road densities projected from the preliminary draft EIS may not reflect actual changes in road-related disturbance, but instead reflect the density of roads that are open and maintained.

Table 3.3. Projected changes in probability assignments for each alternative, Basin-wide and by species for four resident salmonids.

Probability that species status is strong (STR), or either strong or depressed (SR).

Alternative	Bull trout STR	Bull trout SR	Westslope cutthroat STR	Westslope cutthroat SR	Yellowstone cutthroat STR	Yellowstone cutthroat SR	Redband trout STR	Redband trout SR
current*	6.4%	28.3%	21.4%	75.8%	34.1%	62.4%	17.5%	54.3%
1	5.9%	26.8%	20.7%	75.7%	32.5%	61.9%	17.1%	54.3%
2	6.4%	27.6%	21.1%	75.8%	34.1%	62.4%	17.5%	54.3%
3	6.5%	27.9%	21.7%	76.0%	34.2%	62.4%	17.5%	54.3%
4	6.5%	28.0%	21.7%	76.0%	34.5%	62.5%	17.5%	54.3%
5	6.3%	27.6%	21.1%	75.8%	33.1%	61.9%	17.4%	54.3%
6	6.6%	28.3%	21.9%	76.0%	34.5%	62.5%	17.5%	54.3%
7	6.7%	29.1%	22.4%	76.0%	34.6%	62.6%	17.5%	54.3%

*Estimates for current condition.

Relative change* in STR and SR between current and each alternative (DSTR and DSR, respectively).

Alternative	Bull trout DSTR	Bull trout DSR	Westslope cutthroat DSTR	Westslope cutthroat DSR	Yellowstone cutthroat DSTR	Yellowstone cutthroat DSR	Redband trout DSTR	Redband trout DSR
1	-8.5%	-5.2%	-3.4%	-0.2%	-4.8%	-0.9%	-2.0%	—
2	-0.8%	-2.3%	-1.6%	0.0%	—	—	-0.1%	—
3	1.8%	-1.3%	1.2%	0.2%	0.2%	0.0%	0.1%	—
4	2.1%	-1.1%	1.2%	0.2%	1.2%	0.2%	0.2%	—
5	-2.0%	-2.4%	-1.4%	0.0%	-3.1%	-0.8%	-0.7%	—
6	2.8%	-0.1%	2.4%	0.2%	1.0%	0.2%	0.2%	—
7	4.3%	2.9%	4.4%	0.3%	1.4%	0.3%	0.2%	—

*Relative change is calculated as [(projected - current) / current].

Thus, reductions in projected road density may only equate to road closures and not necessarily to road obliteration. Reductions in road density projected through the preliminary draft EISs may not carry the full ecologic and hydrologic benefits associated with true road obliteration, while at the same time increases in density may still carry the full costs. The analysis must be based on trends and a more subjective interpretation of the likely mitigation or exacerbation of that trend as it is tied to watershed restoration activities (for example, true road obliteration and the associated standards under each alternative). Trends predicted with models also are not dramatic and may be understated. For example, relationships between current road densities and the distribution and status of anadromous fishes are weak. This does not imply that roads and their related effects are not important for anadromous fish habitats, rather that the effects of roads may be confounded by the resolution of available data, the limited sample size, and other causes of decline (Lee and others, in press). Other factors likely to influence fish populations are included only to the degree that they will be represented by roads as a surrogate measure of that disturbance.

Table 3.4. Projected changes in probability assignments for Alternative 1, by species.

Alternative 1		Bull Trout		Westslope Cutthroat		Yellowstone Cutthroat		Redband Trout	
EIS	Subbasin	DSTR*	DSR*	DSTR	DSR	DSTR	DSR	DSTR	DSR
EEIS	Methow	-1.1%	-4.5%	-0.6%	-0.3%	—	—	—	—
	Upper Columbia-Entiat	-1.1%	-4.5%	—	—	—	—	—	—
	Wenatchee	-0.4%	-1.5%	0.6%	0.4%	—	—	-0.6%	0.0%
	Naches	0.3%	-2.1%	—	—	—	—	—	—
	Upper Malheur	-0.2%	-2.6%	—	—	—	—	—	—
	Brownlee Reservoir	—	—	—	—	—	—	-1.3%	0.0%
	Imnaha	-1.6%	—	—	—	—	—	—	—
	Upper John Day	-0.1%	-0.9%	—	—	—	—	—	—
	North Fork John Day	-0.2%	-2.8%	—	—	—	—	—	—
	Middle Fork John Day	-0.5%	-5.1%	—	—	—	—	—	—
	Upper Klamath Lake	—	—	—	—	—	—	-3.7%	0.1%
UCRB	Upper Kootenai	-0.4%	-4.0%	-1.1%	-0.1%	—	—	—	—
	Fisher	-0.2%	-1.4%	—	—	—	—	—	—
	Yaak	-0.4%	-2.2%	—	—	—	—	—	—
	Lower Kootenai	-0.3%	-2.4%	-3.1%	-0.3%	—	—	—	—
	Moyie	—	—	-1.9%	-0.4%	—	—	—	—
	Upper Clark Fork	0.1%	2.3%	-1.1%	-1.4%	—	—	—	—
	Flint-Rock	-3.1%	-7.0%	-7.9%	-3.0%	—	—	—	—
	Blackfoot	-0.7%	-3.0%	-2.7%	-0.1%	—	—	—	—
	Middle Clark Fork	-0.3%	-2.8%	-0.5%	-0.1%	—	—	—	—
	Bitterroot	-1.2%	-9.4%	0.0%	-0.6%	—	—	—	—
	Stillwater	-0.5%	-5.9%	—	—	—	—	—	—
	Swan	-1.3%	-15.2%	-3.0%	0.0%	—	—	—	—
	Lower Clark Fork	-0.3%	-3.1%	-1.0%	0.0%	—	—	—	—
	Priest	-0.1%	-1.0%	—	—	—	—	—	—
	St. Joe	-0.2%	-2.3%	-0.5%	-0.1%	—	—	—	—
	Palisades	—	—	—	—	-8.8%	-1.0%	—	—
	Salt	—	—	—	—	-16.5%	-9.1%	—	—
	Teton	—	—	—	—	-2.9%	-0.2%	—	—
	Big Lost	-8.0%	—	—	—	—	—	-3.8%	0.1%
	Big Wood	—	—	—	—	—	—	-6.0%	0.2%
	North & Middle Fork Boise	-3.9%	-0.2%	—	—	—	—	-8.0%	0.3%
	Boise-Mores	-1.2%	—	—	—	—	—	-2.8%	0.1%
	South Fork Boise	-8.6%	-4.7%	—	—	—	—	-11.3%	0.4%
	South Fork Payette	-0.6%	-0.7%	—	—	—	—	-6.7%	0.2%
	Middle Fork Payette	-1.4%	-16.3%	—	—	—	—	-2.3%	0.1%
	Payette	-0.1%	-1.2%	—	—	—	—	—	—
	North Fork Payette	-0.5%	-5.0%	—	—	—	—	-0.9%	0.0%
	Weiser	-0.1%	-0.8%	—	—	—	—	—	—
	Pahsimeroi	-1.6%	—	-7.6%	1.1%	—	—	—	—
	Middle Salmon-Panther	-1.7%	-2.7%	-0.6%	0.2%	—	—	—	—
	Lemhi	-1.0%	-0.3%	-0.7%	-0.1%	—	—	-1.2%	0.0%
	Middle Salmon-Chamberlain	-0.5%	-1.2%	-1.3%	-1.1%	—	—	—	—
	South Fork Salmon	-4.0%	-3.3%	-0.8%	0.0%	—	—	—	—
	Lower Salmon	-0.6%	-6.9%	—	—	—	—	—	—
	Little Salmon	-2.3%	-10.6%	—	—	—	—	—	—
	Upper Selway	-0.1%	-1.5%	—	—	—	—	—	—
	Lochsa	-0.1%	-0.9%	—	—	—	—	—	—
	South Fork Clearwater	-0.2%	-2.3%	—	—	—	—	—	—
	Upper N. Fork Clearwater	-0.4%	-4.1%	-6.4%	0.1%	—	—	-0.6%	0.0%
	Lower N. Fork Clearwater	-0.2%	-2.0%	—	—	—	—	—	—

*DSTR = Change in the probability that species status is strong; DSR = Change in the probability that species status is depressed or strong. "Change" is the difference between the alternative and current.

Table 3.5. Projected changes in probability assignments for Alternative 2, by species.

Alternative 2 EIS	Subbasin	Bull Trout DSTR*	Bull Trout DSR*	Westslope Cutthroat DSTR	Westslope Cutthroat DSR	Yellowstone Cutthroat DSTR	Yellowstone Cutthroat DSR	Redband Trout DSTR	Redband Trout DSR
EEIS	Upper Columbia-Entiat	-1.1%	-4.5%	—	—	—	—	—	—
	Burnt	1.3%	6.8%	—	—	—	—	—	—
	Powder	0.6%	1.9%	—	—	—	—	—	—
	Upper Grande Ronde	0.9%	4.9%	—	—	—	—	—	—
	Upper John Day	0.5%	2.4%	—	—	—	—	—	—
	North Fork John Day	2.8%	2.8%	—	—	—	—	—	—
	Middle Fork John Day	1.1%	3.4%	—	—	—	—	—	—
	Williamson	—	—	—	—	—	—	1.1%	0.0%
	Upper Klamath Lake	—	—	—	—	—	—	-3.7%	0.1%
UCRB	Upper Kootenai	-0.3%	-3.1%	-0.7%	-0.1%	—	—	—	—
	Fisher	-0.2%	-1.4%	—	—	—	—	—	—
	Yaak	-0.4%	-2.2%	—	—	—	—	—	—
	Lower Kootenai	-0.3%	-2.4%	-3.1%	-0.3%	—	—	—	—
	Moyie	—	—	-1.9%	-0.4%	—	—	—	—
	Blackfoot	-0.7%	-2.5%	-2.3%	0.0%	—	—	—	—
	Middle Clark Fork	-0.3%	-2.8%	-0.5%	-0.1%	—	—	—	—
	Bitterroot	-0.8%	-6.0%	-0.1%	-0.5%	—	—	—	—
	Stillwater	-0.5%	-5.9%	—	—	—	—	—	—
	Swan	-1.0%	-11.9%	-3.0%	0.0%	—	—	—	—
	Lower Clark Fork	-0.3%	-3.1%	-0.7%	-0.1%	—	—	—	—
	Priest	-0.1%	-1.0%	—	—	—	—	—	—
	St. Joe	-0.2%	-2.3%	-0.5%	-0.1%	—	—	—	—
	Boise-Mores	0.3%	2.4%	—	—	—	—	—	—
	Lower Salmon	-0.3%	-2.9%	—	—	—	—	—	—
	Little Salmon	-1.8%	-5.3%	—	—	—	—	—	—
	South Fork Clearwater	-0.2%	-2.3%	—	—	—	—	—	—
	Upper N. Fork Clearwater	-0.4%	-4.1%	-6.4%	0.1%	—	—	-0.6%	0.0%
	Lower N. Fork Clearwater	-0.2%	-2.0%	—	—	—	—	—	—

*DSTR = Change in the probability that species status is strong; DSR = Change in the probability that species status is depressed or strong. "Change" is between the alternative and current.

Road distributions—To examine potential patterns of road disturbance on aquatic habitats independent of the models, we also cross-tabulated current known status with current and projected road-density class for each species of interest (table 3.11). Interpretation of these tables was based on a comparison of distributions of road-density class with each alternative. For example, 46 subwatersheds supporting strong Yellowstone cutthroat populations are presently classified as "none" in mean road density (table 3.11). No change is projected for the number of currently strong watersheds in this road-density class under Alternative 1. Some decline in the number of subwatersheds classified as "very low" or "low" is projected while an increase in the number classified as "moderate" or "high" is also expected. The projected trend, then, is for an increase in road densities associated with watersheds currently supporting strong Yellowstone cutthroat trout. As discussed in the previous section, interpretations tied to road densities must be tempered by the understanding that projected reductions in road densities under each alternative do not necessarily equate to true road obliteration. Changes in road densities provide only trend information that may understate associated negative hydrologic and ecologic effects. Road-density changes must therefore be interpreted as trends and in light of the mitigating effects of each alternative.

Table 3.6. Projected changes in probability assignments for Alternative 3, by species.

Alternative 3 EIS	Subbasin	Bull Trout DSTR*	Bull Trout DSR*	Westslope Cutthroat DSTR	Westslope Cutthroat DSR	Yellowstone Cutthroat DSTR	Yellowstone Cutthroat DSR	Redband Trout DSTR	Redband Trout DSR
EEIS	Pend Oreille	0.3%	0.9%	2.6%	0.0%	—	—	—	—
	Kettle	0.5%	1.0%	—	—	—	—	—	—
	Sanpoil	0.5%	1.4%	—	—	—	—	—	—
	Methow	0.8%	2.1%	3.4%	1.6%	—	—	—	—
	Upper Columbia-Entiat	-1.1%	-4.5%	4.1%	2.1%	—	—	—	—
	Wenatchee	0.4%	—	1.6%	0.2%	—	—	—	—
	Naches	-0.4%	—	1.7%	0.9%	—	—	—	—
	Burnt	1.3%	6.8%	—	—	—	—	—	—
	Powder	0.6%	1.9%	—	—	—	—	—	—
	Imnaha	0.1%	1.6%	—	—	—	—	—	—
	Upper Grande Ronde	0.9%	4.9%	—	—	—	—	—	—
	Wallowa	0.2%	2.1%	—	—	—	—	—	—
	North Fork John Day	2.0%	—	—	—	—	—	—	—
	Middle Fork John Day	0.4%	-5.1%	—	—	—	—	—	—
	Upper Deschutes	2.9%	—	—	—	—	—	0.5%	0.0%
	Williamson	—	—	—	—	—	—	1.1%	0.0%
	Upper Klamath Lake	—	—	—	—	—	—	1.9%	-0.1%
UCRB	Upper Kootenai	0.6%	-2.3%	1.0%	-0.3%	—	—	—	—
	Fisher	0.3%	-1.4%	—	—	—	—	—	—
	Yaak	0.3%	-2.2%	—	—	—	—	—	—
	Lower Kootenai	0.1%	0.3%	-3.1%	-0.3%	—	—	—	—
	Moyie	0.3%	—	-1.9%	-0.4%	—	—	—	—
	Upper Clark Fork	0.1%	2.2%	-1.1%	-1.4%	—	—	—	—
	Flint-Rock	-0.1%	-0.6%	2.6%	0.0%	—	—	—	—
	Blackfoot	-0.4%	-0.9%	-2.3%	0.0%	—	—	—	—
	Middle Clark Fork	0.2%	-2.8%	—	—	—	—	—	—
	Bitterroot	—	-4.4%	-0.7%	-0.1%	—	—	—	—
	Stillwater	0.1%	-4.8%	—	—	—	—	—	—
	Swan	-0.5%	-8.6%	-3.0%	0.0%	—	—	—	—
	Lower Clark Fork	-0.1%	-3.1%	0.1%	-0.2%	—	—	—	—
	Pend Oreille Lake	0.1%	0.9%	—	—	—	—	—	—
	Priest	0.7%	2.6%	1.1%	-0.2%	—	—	—	—
	Upper Coeur D.alene	0.9%	—	—	—	—	—	—	—
	St. Joe	-0.1%	-2.1%	-0.5%	-0.1%	—	—	—	—
	Palisades	—	—	—	—	1.2%	0.4%	—	—
	North & Middle Fork Boise	0.2%	0.6%	—	—	—	—	1.0%	0.0%
	Boise-Mores	-1.2%	—	—	—	—	—	-2.8%	0.1%
	South Fork Payette	0.1%	0.4%	—	—	—	—	1.1%	0.0%
	Middle Salmon-Chamberlain	0.1%	1.3%	0.7%	0.2%	—	—	—	—
	Lower Salmon	0.0%	-1.9%	—	—	—	—	—	—
	Little Salmon	-1.0%	-2.6%	—	—	—	—	—	—
	Lower Selway	0.1%	0.2%	1.4%	0.7%	—	—	—	—
	Lochsa	0.3%	-0.6%	2.5%	1.3%	—	—	—	—
	South Fork Clearwater	0.7%	-0.8%	—	—	—	—	—	—
	Clearwater	0.1%	—	2.8%	1.4%	—	—	—	—
	Upper N. Fork Clearwater	-0.1%	-4.0%	-5.0%	0.1%	—	—	-0.6%	0.0%
	Lower N. Fork Clearwater	0.1%	-2.0%	—	—	—	—	—	—

* DSTR = Change in the probability that species status is strong; DSR = Change in the probability that species status is depressed or strong. "Change" is between the alternative and current.

Table 3.7. Projected changes in probability assignments for Alternative 4, by species.

Alternative 4		Bull Trout		Westslope Cutthroat		Yellowstone Cutthroat		Redband Trout	
EIS	Subbasin	DSTR*	DSR*	DSTR	DSR	DSTR	DSR	DSTR	DSR
EEIS	Pend Oreille	0.3%	0.9%	2.6%	0.0%	—	—	—	—
	Kettle	0.5%	1.0%	—	—	—	—	—	—
	Sanpoil	0.5%	1.4%	—	—	—	—	—	—
	Okanogan	0.0%	—	—	—	—	—	—	—
	Methow	0.8%	2.1%	3.4%	1.6%	—	—	—	—
	Upper Columbia-Entiat	-1.1%	-4.5%	4.1%	2.1%	—	—	—	—
	Wenatchee	0.4%	—	1.6%	0.2%	—	—	—	—
	Naches	-0.4%	—	1.7%	0.9%	—	—	—	—
	Brownlee Reservoir	0.3%	2.3%	—	—	—	—	—	—
	Burnt	1.3%	6.8%	—	—	—	—	—	—
	Powder	0.6%	1.9%	—	—	—	—	—	—
	Imnaha	0.1%	1.6%	—	—	—	—	—	—
	Upper Grande Ronde	0.9%	4.9%	—	—	—	—	—	—
	Wallowa	0.2%	2.1%	—	—	—	—	—	—
	Upper John Day	0.3%	0.5%	—	—	—	—	—	—
	North Fork John Day	2.0%	—	—	—	—	—	—	—
	Middle Fork John Day	0.4%	-5.1%	—	—	—	—	—	—
	Upper Deschutes	3.1%	—	—	—	—	—	0.5%	-20.0%
	Lower Crooked	—	—	—	—	—	—	0.8%	-30.0%
	Williamson	—	—	—	—	—	—	1.1%	-40.0%
	Upper Klamath Lake	—	—	—	—	—	—	1.9%	-60.0%
UCRB	Upper Kootenai	0.6%	-2.3%	1.0%	-0.3%	—	—	—	—
	Fisher	0.3%	-1.4%	—	—	—	—	—	—
	Yaak	0.3%	-2.2%	—	—	—	—	—	—
	Lower Kootenai	0.1%	0.3%	-3.1%	-0.3%	—	—	—	—
	Moyie	0.3%	—	-1.9%	-0.4%	—	—	—	—
	Upper Clark Fork	0.1%	2.2%	-1.1%	-1.4%	—	—	—	—
	Flint-Rock	-0.1%	-0.6%	2.6%	0.0%	—	—	—	—
	Blackfoot	-0.5%	-1.4%	-1.9%	0.0%	—	—	—	—
	Middle Clark Fork	0.2%	-2.8%	—	—	—	—	—	—
	Bitterroot	—	-4.4%	-0.7%	-0.1%	—	—	—	—
	Stillwater	0.1%	-4.8%	—	—	—	—	—	—
	Swan	-0.5%	-8.6%	-3.0%	0.0%	—	—	—	—
	Lower Clark Fork	-0.1%	-3.1%	0.1%	-0.2%	—	—	—	—
	Pend Oreille Lake	0.1%	0.9%	—	—	—	—	—	—
	Priest	0.7%	2.6%	1.1%	-0.2%	—	—	—	—
	Upper Coeur D.alene	0.9%	—	—	—	—	—	—	—
	St. Joe	-0.1%	-2.1%	-0.5%	-0.1%	—	—	—	—
	Palisades	—	—	—	—	1.2%	0.4%	—	—
	Salt	—	—	—	—	0.9%	0.1%	—	—
	Lower Henrys	—	—	—	—	3.4%	2.4%	—	—
	Portneuf	—	—	—	—	1.8%	0.1%	—	—
	North & Middle Fork Boise	0.2%	0.6%	—	—	—	—	1.0%	0.0%
	Boise-Mores	-1.2%	—	—	—	—	—	-2.8%	0.1%
	South Fork Payette	0.1%	0.4%	—	—	—	—	1.1%	0.0%
	Middle Fork Payette	0.9%	4.0%	—	—	—	—	2.3%	-0.1%
	North Fork Payette	0.3%	1.6%	—	—	—	—	1.7%	-0.1%
	Weiser	0.3%	2.4%	—	—	—	—	—	—
	Middle Salmon-Chamberlain	0.1%	1.3%	0.7%	0.2%	—	—	—	—
	Lower Salmon	0.0%	-1.9%	—	—	—	—	—	—
	Little Salmon	-1.0%	-2.6%	—	—	—	—	—	—
	Lower Selway	0.1%	0.2%	1.4%	0.7%	—	—	—	—
	Lochsa	0.3%	-0.6%	2.5%	1.3%	—	—	—	—
	South Fork Clearwater	0.7%	-0.8%	—	—	—	—	—	—

Table 3.7 (continued)

Alternative 1 EIS	Subbasin	Bull Trout DSTR*	Bull Trout DSR*	Westslope Cutthroat DSTR	Westslope Cutthroat DSR	Yellowstone Cutthroat DSTR	Yellowstone Cutthroat DSR	Redband Trout DSTR	Redband Trout DSR
	Clearwater	0.1%	—	2.8%	1.4%	—	—	—	—
	Upper N. Fork Clearwater	-0.1%	-4.0%	-5.0%	0.1%	—	—	-0.6%	0.0%
	Lower N. Fork Clearwater	0.1%	-2.0%	—	—	—	—	—	—

*DSTR = Change in the probability that species status is strong; DSR = Change in the probability that species status is depressed or strong. "Change" is between the alternative and current.

Table 3.8. Projected changes in probability assignments for Alternative 5, by species.

Alternative 5 EIS	Subbasin	Bull Trout DSTR*	Bull Trout DSR*	Westslope Cutthroat DSTR	Westslope Cutthroat DSR	Yellowstone Cutthroat DSTR	Yellowstone Cutthroat DSR	Redband Trout DSTR	Redband Trout DSR
EEIS	Upper Columbia-Entiat	-1.1%	-4.5%	—	—	—	—	—	—
	Brownlee Reservoir	—	—	—	—	—	—	-1.3%	0.0%
	Burnt	1.3%	6.8%	—	—	—	—	—	—
	Powder	0.6%	1.9%	—	—	—	—	—	—
	Upper Grande Ronde	0.9%	4.9%	—	—	—	—	—	—
	Upper John Day	0.3%	0.5%	—	—	—	—	—	—
	North Fork John Day	2.0%	—	—	—	—	—	—	—
	Middle Fork John Day	0.4%	-5.1%	—	—	—	—	—	—
	Williamson	—	—	—	—	—	—	1.1%	0.0%
	Upper Klamath Lake	—	—	—	—	—	—	1.9%	-0.1%
UCRB	Upper Kootenai	-0.4%	-4.0%	-1.1%	-0.1%	—	—	—	—
	Fisher	-0.2%	-1.4%	—	—	—	—	—	—
	Yaak	-0.4%	-2.2%	—	—	—	—	—	—
	Lower Kootenai	-0.3%	-2.4%	-3.1%	-0.3%	—	—	—	—
	Moyie	—	—	-1.9%	-0.4%	—	—	—	—
	Upper Clark Fork	0.1%	2.2%	-1.1%	-1.4%	—	—	—	—
	Blackfoot	-0.4%	-0.9%	-2.3%	0.0%	—	—	—	—
	Middle Clark Fork	-0.3%	-2.8%	-0.5%	-0.1%	—	—	—	—
	Bitterroot	—	-4.4%	-0.7%	-0.1%	—	—	—	—
	Stillwater	-0.5%	-5.9%	—	—	—	—	—	—
	Swan	-0.5%	-8.6%	-3.0%	0.0%	—	—	—	—
	Lower Clark Fork	-0.3%	-3.1%	-1.0%	0.0%	—	—	—	—
	Priest	-0.1%	-1.0%	—	—	—	—	—	—
	St. Joe	-0.2%	-2.3%	-0.5%	-0.1%	—	—	—	—
	Salt	—	—	—	—	-16.5%	-9.1%	—	—
	Teton	—	—	—	—	-2.9%	-0.2%	—	—
	Big Lost	-8.0%	—	—	—	—	—	-3.8%	0.1%
	Big Wood	—	—	—	—	—	—	-6.0%	0.2%
	Boise-Mores	-1.2%	—	—	—	—	—	-2.8%	0.1%
	Middle Fork Payette	-1.4%	-16.3%	—	—	—	—	-2.3%	0.1%
	Payette	-0.1%	-1.2%	—	—	—	—	—	—
	North Fork Payette	-0.5%	-5.0%	—	—	—	—	-0.9%	0.0%
	Weiser	-0.1%	-0.8%	—	—	—	—	—	—
	Lower Salmon	0.0%	-1.9%	—	—	—	—	—	—
	Little Salmon	-1.0%	-2.6%	—	—	—	—	—	—
	South Fork Clearwater	0.7%	-0.8%	—	—	—	—	—	—
	Clearwater	0.1%	—	2.8%	1.4%	—	—	—	—
	Upper N. Fork Clearwater	-0.4%	-4.1%	-6.4%	0.1%	—	—	-0.6%	0.0%
	Lower N. Fork Clearwater	-0.2%	-2.0%	—	—	—	—	—	—

*DSTR = Change in the probability that species status is strong; DSR = Change in the probability that species status is depressed or strong. "Change" is the difference between the alternative and current.

Table 3.9. Projected changes in probability assignments for Alternative 6, by species.

Alternative 6 EIS	Subbasin	Bull Trout DSTR*	Bull Trout DSR*	Westslope Cutthroat DSTR	Westslope Cutthroat DSR	Yellowstone Cutthroat DSTR	Yellowstone Cutthroat DSR	Redband Trout DSTR	Redband Trout DSR
EEIS	Pend Oreille	0.3%	0.9%	2.6%	0.0%	—	—	—	—
	Kettle	0.5%	1.0%	—	—	—	—	—	—
	Sanpoil	0.5%	1.4%	—	—	—	—	—	—
	Methow	0.8%	2.1%	3.4%	1.6%	—	—	—	—
	Upper Columbia-Entiat	-1.1%	-4.5%	4.1%	2.1%	—	—	—	—
	Wenatchee	0.4%	—	1.6%	0.2%	—	—	—	—
	Naches	-0.4%	—	1.7%	0.9%	—	—	—	—
	Burnt	1.3%	6.8%	—	—	—	—	—	—
	Powder	0.6%	1.9%	—	—	—	—	—	—
	Imnaha	0.1%	1.6%	—	—	—	—	—	—
	Upper Grande Ronde	0.9%	4.9%	—	—	—	—	—	—
	Wallowa	0.2%	2.1%	—	—	—	—	—	—
	Upper John Day	0.5%	2.4%	—	—	—	—	—	—
	North Fork John Day	2.8%	2.8%	—	—	—	—	—	—
	Middle Fork John Day	1.1%	3.4%	—	—	—	—	—	—
	Upper Deschutes	2.9%	—	—	—	—	—	0.5%	0.0%
	Williamson	—	—	—	—	—	—	1.1%	0.0%
	Upper Klamath Lake	—	—	—	—	—	—	1.9%	-0.1%
UCRB	Upper Kootenai	0.6%	-2.3%	1.0%	-0.3%	—	—	—	—
	Fisher	0.3%	-1.4%	—	—	—	—	—	—
	Yaak	0.3%	-2.2%	—	—	—	—	—	—
	Lower Kootenai	0.1%	0.3%	-3.1%	-0.3%	—	—	—	—
	Moyie	0.3%	0.0%	-1.9%	-0.4%	—	—	—	—
	Flint-Rock	-0.1%	-0.6%	2.6%	0.0%	—	—	—	—
	Blackfoot	0.2%	1.3%	1.6%	-0.1%	—	—	—	—
	Middle Clark Fork	0.2%	-2.8%	—	—	—	—	—	—
	Stillwater	0.1%	-4.8%	—	—	—	—	—	—
	Swan	0.2%	-0.4%	1.1%	0.1%	—	—	—	—
	Lower Clark Fork	-0.1%	-3.1%	0.1%	-0.2%	—	—	—	—
	Pend Oreille Lake	0.1%	0.9%	—	—	—	—	—	—
	Priest	0.7%	2.6%	1.1%	-0.2%	—	—	—	—
	Upper Coeur D.alene	0.9%	—	—	—	—	—	—	—
	St. Joe	-0.1%	-2.1%	-0.5%	-0.1%	—	—	—	—
	Palisades	—	—	—	—	1.2%	0.4%	—	—
	Lower Henrys	—	—	—	—	3.4%	2.4%	—	—
	Portneuf	—	—	—	—	1.8%	0.1%	—	—
	North & Middle Fork Boise	0.2%	0.6%	—	—	—	—	1.0%	0.0%
	Boise-Mores	0.3%	2.4%	—	—	—	—	—	—
	South Fork Payette	0.1%	0.4%	—	—	—	—	1.1%	0.0%
	Middle Salmon-Chamberlain	0.1%	1.3%	0.7%	0.2%	—	—	—	—
	Little Salmon	0.6%	5.6%	—	—	—	—	—	—
	Lower Selway	0.1%	0.2%	1.4%	0.7%	—	—	—	—
	Lochsa	0.3%	-0.6%	2.5%	1.3%	—	—	—	—
	South Fork Clearwater	0.9%	1.6%	—	—	—	—	—	—
	Clearwater	0.1%	—	2.8%	1.4%	—	—	—	—
	Upper N. Fork Clearwater	-0.1%	-4.0%	-5.0%	0.1%	—	—	-0.6%	0.0%
	Lower N. Fork Clearwater	0.1%	-2.0%	—	—	—	—	—	—

*DSTR = Change in the probability that species status is strong; DSR = Change in the probability that species status is depressed or strong. "Change" is the difference between the alternative and current.

Table 3.10. Projected changes in probability assignments for Alternative 7, by species.

Alternative 7		Bull Trout		Westslope Cutthroat		Yellowstone Cutthroat		Redband Trout	
EIS	Subbasin	DSTR*	DSR*	DSTR	DSR	DSTR	DSR	DSTR	DSR
EEIS	Pend Oreille	0.3%	0.9%	2.6%	0.0%	—	—	—	—
	Kettle	0.7%	3.5%	—	—	—	—	—	—
	Sanpoil	0.5%	1.4%	—	—	—	—	—	—
	Methow	0.8%	2.1%	3.4%	1.6%	—	—	—	—
	Upper Columbia-Entiat	—	—	4.1%	2.1%	—	—	—	—
	Wenatchee	0.4%	—	1.6%	0.2%	—	—	—	—
	Naches	-0.4%	—	1.7%	0.9%	—	—	—	—
	Burnt	1.3%	6.8%	—	—	—	—	—	—
	Powder	0.6%	1.9%	—	—	—	—	—	—
	Imnaha	0.1%	1.6%	—	—	—	—	—	—
	Upper Grande Ronde	0.9%	4.9%	—	—	—	—	—	—
	Wallowa	0.2%	2.1%	—	—	—	—	—	—
	Upper John Day	0.5%	2.4%	—	—	—	—	—	—
	North Fork John Day	2.8%	2.8%	—	—	—	—	—	—
	Middle Fork John Day	1.1%	3.4%	—	—	—	—	—	—
	Upper Deschutes	3.1%	—	—	—	—	—	0.5%	0.0%
	Williamson	—	—	—	—	—	—	1.1%	0.0%
	Upper Klamath Lake	—	—	—	—	—	—	1.9%	-0.1%
UCRB	Upper Kootenai	1.1%	3.9%	3.7%	-0.2%	—	—	—	—
	Fisher	0.7%	2.9%	1.0%	0.1%	—	—	—	—
	Yaak	1.5%	13.5%	0.7%	0.2%	—	—	—	—
	Lower Kootenai	0.6%	6.1%	3.5%	-0.3%	—	—	—	—
	Moyie	1.3%	11.9%	—	—	—	—	—	—
	Flint-Rock	-0.1%	-0.6%	2.6%	0.0%	—	—	—	—
	Blackfoot	0.2%	1.3%	2.0%	-0.1%	—	—	—	—
	Middle Clark Fork	0.7%	2.1%	1.1%	0.0%	—	—	—	—
	Flathead Lake	0.5%	1.4%	—	—	—	—	—	—
	Stillwater	1.0%	5.6%	—	—	—	—	—	—
	Swan	0.2%	-0.4%	1.1%	0.1%	—	—	—	—
	Lower Clark Fork	0.9%	2.0%	1.8%	0.0%	—	—	—	—
	Pend Oreille Lake	0.4%	4.6%	—	—	—	—	—	—
	Priest	0.7%	2.6%	2.2%	-0.3%	—	—	—	—
	Upper Coeur D'Alene	1.1%	2.0%	—	—	—	—	—	—
	St. Joe	0.2%	0.8%	—	—	—	—	—	—
	Palisades	—	—	—	—	1.2%	0.4%	—	—
	Upper Henrys	—	—	—	—	2.4%	0.6%	—	—
	Lower Henrys	—	—	—	—	3.4%	2.4%	—	—
	Portneuf	—	—	—	—	1.8%	0.1%	—	—
	North & Middle Fork Boise	0.2%	0.6%	—	—	—	—	1.0%	0.0%
	Boise-Mores	0.3%	2.4%	—	—	—	—	—	—
	South Fork Payette	0.1%	0.4%	—	—	—	—	1.1%	0.0%
	North Fork Payette	0.1%	1.4%	—	—	—	—	—	—
	Middle Salmon-Chamberlain	0.1%	1.3%	0.7%	0.2%	—	—	—	—
	Little Salmon	0.6%	5.6%	—	—	—	—	—	—
	Lower Selway	0.1%	0.2%	1.4%	0.7%	—	—	—	—
	Lochsa	0.3%	-0.6%	2.5%	1.3%	—	—	—	—
	South Fork Clearwater	0.9%	1.6%	—	—	—	—	—	—
	Clearwater	0.1%	—	2.8%	1.4%	—	—	—	—
	Upper N. Fork Clearwater	0.3%	1.2%	0.8%	-0.1%	—	—	—	—
	Lower N. Fork Clearwater	0.3%	1.0%	—	—	—	—	—	—

*DSTR = Change in the probability that species status is strong; DSR = Change in the probability that species status is depressed or strong. "Change" is the difference between the alternative and current.

Table 3.11. Current known status (strong or depressed) for each of seven salmonids versus current (Alternative 0) mean road density class and the projected allocation and distribution of road density classes for each alternative.

Bull trout		Mean Road Density (miles of road / mi²)					
Alternative	Status	None < 0.02	Very Low 0.02 - 0.1	Low 0.1 - 0.7	Moderate 0.7 - 1.7	High 1.7 - 4.7	Extremely High > 4.7
0	Depressed	60	24	134	238	352	4
	Strong	124	24	72	22	28	0
1	Depressed	54	20	112	241	381	4
	Strong	117	19	72	32	30	0
2	Depressed	59	25	137	256	333	2
	Strong	123	26	66	27	28	0
3	Depressed	59	29	188	403	133	0
	Strong	121	33	70	38	8	0
4	Depressed	59	30	192	403	128	0
	Strong	121	33	71	37	8	0
5	Depressed	59	27	141	301	283	1
	Strong	121	28	67	29	25	0
6	Depressed	60	29	205	387	131	0
	Strong	124	30	74	34	8	0
7	Depressed	60	31	221	370	130	0
	Strong	124	30	76	32	8	0

Westslope cutthroat trout		Mean Road Density (miles of road / mi²)					
Alternative	Status	None < 0.02	Very Low 0.02 - 0.1	Low 0.1 - 0.7	Moderate 0.7 - 1.7	High 1.7 - 4.7	Extremely High > 4.7
0	Depressed	87	39	180	350	822	7
	Strong	192	34	109	110	139	3
1	Depressed	79	35	151	348	865	7
	Strong	185	31	98	117	153	3
2	Depressed	81	42	174	342	839	7
	Strong	191	34	102	115	142	3
3	Depressed	81	47	210	788	358	1
	Strong	191	40	136	194	24	2
4	Depressed	81	47	210	794	352	1
	Strong	191	40	136	195	23	2
5	Depressed	81	44	174	430	750	6
	Strong	191	35	105	129	125	2
6	Depressed	87	44	228	775	350	1
	Strong	191	41	140	189	24	2
7	Depressed	87	45	237	769	346	1
	Strong	192	40	154	175	24	2

Table 3.11 (continued)

Yellowstone cutthroat trout		Mean Road Density (miles of road / mi^2)					
Alternative	Status	None < 0.02	Very Low 0.02 - 0.1	Low 0.1 - 0.7	Moderate 0.7 - 1.7	High 1.7 - 4.7	Extremely High > 4.7
0	Depressed	4	8	19	51	91	0
	Strong	46	25	59	42	37	0
1	Depressed	2	2	20	51	98	0
	Strong	46	21	56	45	41	0
2	Depressed	4	8	19	50	92	0
	Strong	46	25	59	42	37	0
3	Depressed	4	8	20	52	89	0
	Strong	46	25	59	43	36	0
4	Depressed	4	8	28	49	84	0
	Strong	46	25	60	42	36	0
5	Depressed	4	7	17	47	98	0
	Strong	46	25	55	45	38	0
6	Depressed	4	8	23	51	87	0
	Strong	46	25	59	43	36	0
7	Depressed	4	8	23	51	87	0
	Strong	46	25	59	43	36	0

Redband trout		Mean Road Density (miles of road / mi^2)					
Alternative	Status	None < 0.02	Very Low 0.02 - 0.1	Low 0.1 - 0.7	Moderate 0.7 - 1.7	High 1.7 - 4.7	Extremely High > 4.7
0	Depressed	148	37	365	678	772	21
	Strong	49	24	114	188	428	13
1	Depressed	135	32	339	702	792	21
	Strong	34	20	115	200	434	13
2	Depressed	148	37	360	829	637	10
	Strong	49	25	118	282	339	3
3	Depressed	148	38	406	973	451	5
	Strong	47	36	121	343	266	3
4	Depressed	148	40	416	1025	388	4
	Strong	48	38	129	370	228	3
5	Depressed	141	39	364	911	557	9
	Strong	38	26	127	312	310	3
6	Depressed	148	39	417	987	425	5
	Strong	49	36	128	340	260	3
7	Depressed	148	40	425	982	422	4
	Strong	49	37	127	340	260	3

Table 3.11 (continued)

Steelhead trout		Mean Road Density (miles of road / mi²)					
Alternative	Status	None < 0.02	Very Low 0.02 - 0.1	Low 0.1 - 0.7	Moderate 0.7 - 1.7	High 1.7 - 4.7	Extremely High > 4.7
0	Depressed	199	52	240	406	518	16
	Strong	0	0	3	7	12	1
1	Depressed	189	45	224	423	534	16
	Strong	0	0	2	7	13	1
2	Depressed	199	53	242	490	443	4
	Strong	0	0	5	13	5	0
3	Depressed	197	63	281	629	258	3
	Strong	0	0	4	16	3	0
4	Depressed	197	63	281	635	252	3
	Strong	0	0	4	16	3	0
5	Depressed	197	57	241	583	350	3
	Strong	0	0	4	14	5	0
6	Depressed	199	61	289	628	251	3
	Strong	0	0	5	15	3	0
7	Depressed	199	61	290	628	250	3
	Strong	0	0	5	15	3	0

Stream-type chinook salmon		Mean Road Density (miles of road / mi²)					
Alternative	Status	None < 0.02	Very Low 0.02 - 0.1	Low 0.1 - 0.7	Moderate 0.7 - 1.7	High 1.7 - 4.7	Extremely High > 4.7
0	Depressed	101	30	129	153	247	8
	Strong	0	2	1	1	3	1
1	Depressed	97	31	110	164	258	8
	Strong	0	2	1	1	3	1
2	Depressed	101	31	131	193	210	2
	Strong	0	2	2	3	1	0
3	Depressed	100	34	161	275	97	1
	Strong	0	2	2	3	1	0
4	Depressed	100	34	161	276	96	1
	Strong	0	2	2	3	1	0
5	Depressed	100	32	131	248	156	1
	Strong	0	2	2	3	1	0
6	Depressed	101	33	167	270	96	1
	Strong	0	2	2	3	1	0
7	Depressed	101	33	168	270	95	1
	Strong	0	2	2	3	1	0

Table 3.11 (continued)

Ocean-type chinook salmon		Mean Road Density (miles of road / mi²)					
Alternative	Status	None < 0.02	Very Low 0.02 - 0.1	Low 0.1 - 0.7	Moderate 0.7 - 1.7	High 1.7 - 4.7	Extremely High > 4.7
0	Depressed	4	1	15	30	21	0
	Strong	0	0	7	12	6	0
1	Depressed	3	2	15	30	21	0
	Strong	0	0	7	12	6	0
2	Depressed	4	1	15	30	21	0
	Strong	0	0	7	12	6	0
3	Depressed	4	2	15	43	7	0
	Strong	0	0	7	15	3	0
4	Depressed	4	2	15	44	6	0
	Strong	0	0	7	15	3	0
5	Depressed	4	1	15	30	21	0
	Strong	0	0	7	12	6	0
6	Depressed	4	2	15	43	7	0
	Strong	0	0	7	15	3	0
7	Depressed	4	2	15	43	7	0
	Strong	0	0	7	15	3	0

Ownership and management class—We cross-tabulated the current known and predicted status of each key species with an ownership and management designation developed by the SIT Aquatics Team (Lee and others, in press) for each subwatershed (tables 3.12-3.18). Allocation of ownership and management designation was used to consider the relative significance of management activities on FS- and BLM-administered lands. For example, 139 subwatersheds known or predicted to support strong Yellowstone cutthroat trout are found on Forest Service-administered lands (for example, management clusters: FG, FH, FM, FW in table 3.14) but none are on BLM-administered lands (management cluster BR in table 3.14). Thus, approximately 66 percent of all the currently strong populations are associated with FS-administered lands and are likely to be influenced directly by the activities considered under these alternatives.

Management activities—The projected forest and range management activities vary in intensity under each alternative. They also vary spatially within and among the alternatives by forest and rangeland cluster. To further our evaluation of the potential influence of management activities on the distribution and status of the salmonid species, we summarized activities across species distributions and status classifications. We considered timber harvest, thinning, watershed restoration, prescribed burning, livestock management, and riparian restoration as potentially important management activities in our summary. All activities were not given equal importance. For example, livestock management is expected to have only a minor influence on aquatic habitats relative to active riparian restoration, which includes fencing and the potential to fully exclude livestock from critical habitats.

Management activities summary tables were generated in a four-step process. First, we tallied the number of subwatersheds for each species and status-class by forest and rangeland clusters and summarized as a proportion of the total occurrence in the entire assessment area (table 3.19). For example, 62 percent of the Yellowstone cutthroat trout subwatersheds currently considered strong occur in Forest Cluster 1 (table 3.19). Second, we used the assignment of activity levels and the midpoint of reported rates for each activity (see appendix I; tables 3 and 10 in the "Rule Sets for Management Activity Levels by Cluster by Alternative" section of the preliminary draft EIS)

to estimate the rate of implementation for each activity by cluster and alternative. Third, we multiplied the activity rate by the proportion of the species distribution occurring in the appropriate forest or range cluster. Finally, we summed across cluster by species occurrence, status, or class to estimate the total proportion of the distribution that would be influenced by a particular activity per decade (table 3.20). For example, under Alternative 1 we would anticipate that 2.8 percent of the current distribution of strong subwatersheds for Yellowstone cutthroat trout would be exposed to timber harvest per decade, 1.3 percent to thinning, 1.3 percent to watershed restoration (table 3.20), and so on.

We assumed that an activity would have the same effect in any watershed unless mitigating or exacerbating activities were clearly identified within the alternative. The summaries provided simple indices for comparisons across species distributions and among alternatives. Many land-use management activities have been generally associated with disruption of watershed function and negative effects on the processes that maintain and create high-quality habitats for fishes (Lee and others, in press). However, we had no method to weigh or model the effects of land use and management activities allocated under each alternative as we did with road allocation. Thus, we were forced to evaluate risks largely on the content and direction of each alternative and the allocation of activities across a species range.

Although the risks associated with land use can be mitigated by careful planning, analysis, and implementation, we generally assumed that increased levels of ground-disturbing activities associated with timber harvest and thinning increased risks for the species considered. We assumed that watershed and riparian restoration, and livestock management would have positive net effects and provide the greatest benefits for species in watersheds with the potential to respond. It was not clear, however, how effective those activities would be in restoring watershed and hydrologic processes.

Table 3.12. Summary of current known and predicted status of seven salmonid species versus ownership and land management designation for each subwatershed. The data represent a summary of the current status databases by management cluster as defined in Lee and others (1996).

Bull trout

Management cluster[1]	Absent[2]	Depressed[2]	Strong[2]	Total	Percent
BR	207	21	2	230	5.23
FG	203	86	46	335	7.62
FH	354	112	17	483	10.98
FM	428	294	34	756	17.19
FW	278	131	155	564	12.82
NP	33	8	2	43	0.98
PA	590	19	2	611	13.89
PF	752	108	7	867	19.71
PR	304	11	2	317	7.21
TL	167	23	3	193	4.39
Total	3316	813	270	4399	100

[1]BR = BLM rangelands; FG = FS forest and rangeland, moderate impact, grazed; FH = FS forest, high impact, grazed; FM = FS forest, high-moderate impact, no grazing; FW = FS-managed wilderness; NP = NPS forestland; PA = Private agriculture; PF = Private land and FS forestland; PR = Private and BLM rangeland; TL = Tribal lands.

[2]Known + predicted.

Table 3.13. Summary of current known and predicted status of seven salmonid species versus ownership and land management designation for each subwatershed. The data represent a summary of the current status databases by management cluster as defined in Lee and others (1996).

Westslope cutthroat trout

Management cluster[1]	Absent[2]	Depressed[2]	Strong[2]	Total	Percent
BR	3	55	4	62	2.35
FG	32	89	68	189	7.16
FH	55	145	40	240	9.09
FM	44	504	154	702	26.59
FW	83	120	277	480	18.18
NP	2	40	0	42	1.59
PA	153	47	0	200	7.58
PF	138	413	38	589	22.31
PR	36	21	1	58	2.2
TL	23	50	5	78	2.95
Total	569	1484	587	2640	100

[1]BR = BLM rangelands; FG = FS forest and rangeland, moderate impact, grazed; FH = FS forest, high impact, grazed; FM = FS forest, high-moderate impact, no grazing; FW = FS-managed wilderness; NP = NPS forestland; PA = Private agriculture; PF = Private land and FS forestland; PR = Private and BLM rangeland; TL = Tribal lands.

[2]Known + predicted.

Table 3.14. Summary of current known and predicted status of seven salmonid species versus ownership and land management designation for each subwatershed. The data represent a summary of the current status databases by management cluster as defined in Lee and others (1996).

Yellowstone cutthroat trout

Management cluster[1]	Absent[2]	Depressed[2]	Strong[2]	Total	Percent
BR	28	2	0	30	4.9
FG	4	44	55	103	16.83
FH	25	20	42	87	14.22
FM	7	4	3	14	2.29
FW	0	8	39	47	7.68
NP	1	1	22	24	3.92
PA	75	45	19	139	22.71
PF	10	35	25	70	11.44
PR	61	12	4	77	12.58
TL	19	2	0	21	3.43
Total	230	173	209	612	100

[1]BR = BLM rangelands; FG = FS forest and rangeland, moderate impact, grazed; FH = FS forest, high impact, grazed; FM = FS forest, high-moderate impact, no grazing; FW = FS-managed wilderness; NP = NPS forestland; PA = Private agriculture; PF = Private land and FS forestland; PR = Private and BLM rangeland; TL = Tribal lands.

[2]Known + predicted.

Table 3.15. Summary of current known and predicted status of seven salmonid species versus ownership and land management designation for each subwatershed. The data represent a summary of the current status databases by management cluster as defined in Lee and others (1996).

Redband trout

Management cluster[1]	Absent[2]	Depressed[2]	Strong[2]	Total	Percent
BR	724	284	36	1044	19.59
FG	87	137	126	350	6.57
FH	110	318	202	630	11.82
FM	131	219	13	363	6.81
FW	191	178	75	444	8.33
NP	0	8	0	8	0.15
PA	614	347	13	974	18.28
PF	207	212	245	664	12.46
PR	370	290	19	679	12.74
TL	60	27	86	173	3.25
Total	2494	2020	815	5329	100

[1]BR = BLM rangelands; FG = FS forest and rangeland, moderate impact, grazed; FH = FS forest, high impact, grazed; FM = FS forest, high-moderate impact, no grazing; FW = FS-managed wilderness; NP = NPS forestland; PA = Private agriculture; PF = Private land and FS forestland; PR = Private and BLM rangeland; TL = Tribal lands.

[2]Known + predicted.

Table 3.16. Summary of current known and predicted status of seven salmonid species versus ownership and land management designation for each subwatershed. The data represent a summary of the current status databases by management cluster as defined in Lee and others (1996).

Steelhead trout

Management cluster[1]	Absent[2]	Depressed[2]	Migration[2]	Strong[2]	Total	Percent
BR	729	31	10	0	770	20.66
FG	122	155	1	5	283	7.59
FH	231	214	7	8	460	12.34
FM	78	166	20	1	265	7.11
FW	69	277	46	2	394	10.57
NP	0	0	0	0	0	0
PA	216	205	107	2	530	14.22
PF	238	188	18	2	446	11.97
PR	268	142	40	0	450	12.07
TL	66	53	7	3	129	3.46
Total	2017	1431	256	23	3727	100

[1]BR = BLM rangelands; FG = FS forest and rangeland, moderate impact, grazed; FH = FS forest, high impact, grazed; FM = FS forest, high-moderate impact, no grazing; FW = FS-managed wilderness; NP = NPS forestland; PA = Private agriculture; PF = Ptivate land and FS forestland; PR = Private and BLM rangeland; TL = Tribal lands.

[2]Known + predicted.

Table 3.17. Summary of current known and predicted status of seven salmonid species versus ownership and land management designation for each subwatershed. The data represent a summary of the current status databases by management cluster as defined in Lee and others (1996).

Stream-type chinook salmon

Management cluster[1]	Absent[2]	Depressed[2]	Migration[2]	Strong[2]	Total	Percent
BR	721	10	18	0	749	21.72
FG	168	91	10	1	270	7.83
FH	291	117	9	3	420	12.18
FM	130	111	19	0	260	7.54
FW	165	168	47	3	383	11.11
NP	0	0	0	0	0	0
PA	332	45	105	0	482	13.98
PF	301	79	23	1	404	11.72
PR	316	28	49	0	393	11.40
TL	67	19	1	0	87	2.52
Total	2491	668	281	8	3448	100

[1]BR = BLM rangelands; FG = FS forest and rangeland, moderate impact, grazed; FH = FS forest, high impact, grazed; FM = FS forest, high-moderate impact, no grazing; FW = FS-managed wilderness; NP = NPS forestland; PA = Private agriculture; PF = Private land and FS forestland; PR = Private and BLM rangeland; TL = Tribal lands.

[2]Known + predicted.

Table 3.18. Summary of current known and predicted status of seven salmonid species versus ownership and land management designation for each subwatershed. The data represent a summary of the current status databases by management cluster as defined in Lee and others (1996).

Ocean-type chinook salmon

Management cluster[1]	Absent[2]	Depressed[2]	Migration[2]	Strong[2]	Total	Percent
BR	21	0	0	0	21	3.87
FG	19	2	0	1	22	4.06
FH	36	4	0	0	40	7.38
FM	12	3	0	2	17	3.14
FW	19	8	0	0	27	4.98
NP	0	0	0	0	0	0
PA	89	21	43	5	158	29.15
PF	68	14	11	8	101	18.63
PR	72	15	9	5	101	18.63
TL	50	4	1	0	55	10.15
Total	386	71	64	21	542	100

[1]BR = BLM rangelands; FG = FS forest and rangeland, moderate impact, grazed; FH = FS forest, high impact, grazed; FM = FS forest, high-moderate impact, no grazing; FW = FS-managed wilderness; NP = NPS forestland; PA = Private agriculture; PF = Private land and FS forestland; PR = Private and BLM rangeland; TL = Tribal lands.

[2]Known + predicted.

Table 3.19. Distribution of species status for the seven key salmonids by forest and range cluster. Estimates represent the percent of subwatersheds for that species and status associated with each cluster defined in the preliminary draft EISs.

Species Distributions by Cluster

Species Category	Forest Cluster						Range Cluster					
	1	2	3	4	5	6	1	2	3	4	5	6
Bull trout												
Present	15.8	29.3	16.1	20.3	9.2	4.5	3.0	18.2	31.1	4.2	16.4	2.1
Strong	45.2	33.0	8.5	7.8	3.3	0.4	0.4	33.0	20.7	1.1	17.0	3.3
Depressed	11.7	26.4	19.7	26.1	11.1	2.3	1.8	8.9	37.3	2.5	14.0	2.3
Westslope cutthroat trout												
Present	17.6	24.3	16.2	33.9	3.2	4.3	0.8	18.4	28.0	0.6	13.8	0
Strong	30.3	41.2	8.5	16.7	1.7	0.3	0	44.1	12.9	1.2	11.9	0
Depressed	12.8	15.5	17.2	44.0	4.0	6.2	1.3	5.7	33.9	0.5	12.9	0
Yellowstone cutthroat trout												
Present	30.3	9.4	0	2.3	6.0	20.9	0	11.5	12.4	0	24.8	51.4
Strong	61.7	12.0	0	0.0	0.0	14.4	0	23.4	19.6	0	41.1	15.8
Depressed	1.7	9.8	0	5.2	15.6	33.5	0	0.6	7.5	0	11.0	80.9
Redband trout												
Present	5.7	18.5	11.6	6.6	22.5	14.1	8.9	11.9	28.9	9.6	18.6	18.3
Strong	0.5	17.8	14.7	5.1	27.9	19.2	5.9	8.9	33.7	11.9	17.8	19.4
Depressed	8.3	14.6	9.8	6.3	24.0	10.2	11.2	8.0	25.6	10.5	18.9	19.1
Steelhead trout												
Strong	0	13.0	0	0	56.5	0	47.8	0	0	30.4	0	8.7
Depressed	13.1	33.1	21.4	1.7	20.8	0.6	10.7	21.9	28.7	7.8	19.0	5.7
Corridor	8.6	25.3	18.7	4.7	3.5	5.8	9.3	19.5	14.4	36.2	14.4	0
Stream-type chinook salmon												
Strong	0	0	0	0	100	0	12.5	0	50.0	0	0	37.5
Depressed	19.2	40.0	17.4	0.9	20.8	0.1	6.1	27.1	30.7	3.4	17.8	4.5
Corridor	10.6	29.8	19.1	6.0	6.4	2.1	9.9	20.6	13.8	25.2	22.0	2.8
Ocean-type chinook salmon												
Strong	0	36.0	20.0	0.0	28.0	0	36.0	36.0	16.0	8.0	4.0	0
Depressed	1.4	33.8	9.9	11.3	16.9	12.7	5.6	33.8	0	33.8	15.5	11.3
Corridor	0	0	24.6	15.4	0	9.2	0	0	20.0	64.6	15.4	0
Fringe Areas												
Bull trout	0	0	18.2	0	63.6	0	0	0	81.8	0	18.2	0
Westslope cutthroat trout	0	0	0	0	100	0	100	0	0	0	0	0
Redband trout	0	0	0	0	0	33.3	0	0	0	0	0	100
Ocean-type chinook salmon	0	48.0	20.0	0	24.0	0	0	44.0	0	28.0	4.0	24.0

Table 3.20. Forest and range management activities and distributions of seven key salmonids. Estimates represent the percentage of the species distribution for the specified status or category predicted to experience the activity per decade. Estimates are based on the allocation of activities by alternative in the preliminary draft EIS, and on the distribution and status of each species as defined in Lee and others (1996).

			Forest Activity				Range Activity	
Species	Status	Alt.	Harvest	Thinning	Watershed Restoration	Prescribed Burning	Livestock Management	Riparian Restoration
Bull trout								
	Strong							
		1	4.7	2.1	1.5	2.5	7.8	0.9
		2	2.6	1.8	3.6	2.5	10.6	0.9
		3	3.3	2.4	3.6	6.4	9.5	16.0
		4	3.3	3.6	4.9	9.3	10.6	28.7
		5	3.6	2.6	3.7	4.5	10.5	8.9
		6	2.8	3.3	3.9	7.0	11.8	21.1
		7	2.0	1.6	1.5	3.2	12.1	2.5
	Depressed							
		1	7.1	3.2	1.5	2.4	5.4	0.8
		2	3.8	2.6	2.9	2.4	9.2	0.8
		3	5.0	4.2	2.9	5.0	8.4	20.5
		4	5.0	5.5	4.6	8.3	9.2	25.4
		5	5.9	4.7	3.2	5.1	9.1	8.4
		6	3.6	5.0	3.8	7.1	10.2	11.7
		7	1.9	1.8	1.5	4.6	10.7	2.6
	Fringe							
		1	7.4	3.7	1.2	2.0	7.9	1.2
		2	2.4	3.1	1.7	2.0	14.7	1.2
		3	5.7	5.3	1.7	2.9	13.6	38.0
		4	5.7	5.7	3.3	7.6	14.7	38.0
		5	5.7	5.7	3.3	5.7	14.7	7.9
		6	2.0	5.3	3.3	7.6	16.0	7.9
		7	1.6	3.1	1.2	2.9	16.0	1.2
Westslope cutthroat trout								
	Strong							
		1	5.5	2.3	1.5	2.5	8.6	0.8
		2	3.0	2.0	3.5	2.5	10.3	0.8
		3	3.7	2.8	3.2	6.1	9.6	10.0
		4	3.7	4.2	5.2	9.1	10.3	26.7
		5	4.2	3.0	3.5	4.8	10.3	5.7
		6	3.2	4.0	3.9	7.0	11.1	21.9
		7	2.0	1.5	1.5	3.6	11.2	1.3
	Depressed							
		1	7.4	3.4	1.5	2.5	4.4	0.7
		2	4.4	2.9	2.6	2.5	7.7	0.7
		3	5.4	5.0	2.6	4.5	6.9	17.9
		4	5.4	5.9	4.3	7.9	7.7	20.6
		5	7.0	5.3	2.7	4.4	7.6	6.1
		6	4.5	5.5	3.8	7.1	8.6	8.1
		7	2.0	1.6	1.5	5.5	8.7	0.8

Table 3.20 (continued)

Species	Status	Alt.	Forest Activity: Harvest	Forest Activity: Thinning	Forest Activity: Watershed Restoration	Forest Activity: Prescribed Burning	Range Activity: Livestock Management	Range Activity: Riparian Restoration
	Fringe							
		1	9.0	4.5	1.5	2.5	3.0	1.2
		2	2.0	4.5	1.5	2.5	9.0	1.2
		3	7.0	7.0	1.5	2.5	9.0	1.2
		4	7.0	7.0	4.0	10.0	9.0	38.0
		5	7.0	7.0	4.0	7.0	3.0	38.0
		6	2.5	7.0	4.0	10.0	9.0	38.0
		7	2.0	4.5	1.5	2.5	16.0	1.2
Yellowstone cutthroat trout								
	Strong							
		1	2.8	1.3	1.3	2.2	7.2	1.2
		2	1.8	1.3	3.2	2.2	12.0	1.2
		3	2.2	2.1	3.2	5.5	9.5	29.4
		4	2.2	2.5	3.5	8.4	12.0	38.0
		5	2.8	1.8	3.2	3.4	12.0	22.2
		6	2.2	2.5	3.2	6.2	14.9	30.8
		7	1.8	1.3	1.3	2.8	16.0	7.0
	Depressed							
		1	3.7	1.3	0.8	1.4	2.9	1.0
		2	1.3	1.3	1.1	1.4	7.9	1.0
		3	2.1	3.3	1.1	1.8	7.4	31.3
		4	2.1	3.5	1.7	4.5	7.9	31.5
		5	3.5	2.6	1.4	3.6	7.9	29.0
		6	1.6	3.5	1.5	4.2	8.6	29.2
		7	1.1	1.2	0.8	2.8	13.2	25.6
Redband trout								
	Strong							
		1	6.5	2.7	1.3	2.1	6.1	1.2
		2	2.5	2.3	2.1	2.1	11.8	1.2
		3	4.3	4.6	2.1	3.6	10.7	27.2
		4	4.3	5.5	3.5	7.4	11.8	37.1
		5	5.3	4.5	2.8	5.7	11.4	21.4
		6	2.4	5.1	2.9	6.8	13.0	24.7
		7	1.7	2.1	1.3	3.9	15.6	12.7
	Depressed							
		1	5.3	2.3	1.1	1.8	5.4	1.1
		2	2.1	2.0	1.9	1.8	10.8	1.1
		3	3.6	3.6	1.9	3.3	9.6	24.5
		4	3.6	4.3	3.1	6.5	10.8	35.5
		5	4.3	3.6	2.5	4.5	10.1	23.1
		6	2.1	4.1	2.7	5.9	12.1	26.1
		7	1.5	1.8	1.1	3.0	14.9	12.0
	Fringe							
		1	2.0	0.5	0.5	0.8	3.0	1.2
		2	0.7	0.5	0.5	0.8	9.0	1.2
		3	0.8	2.3	0.5	0.8	9.0	38.0
		4	0.8	2.3	0.5	2.3	9.0	38.0
		5	2.3	1.5	0.5	2.3	9.0	38.0
		6	0.8	2.3	0.5	2.3	9.0	38.0
		7	0.7	0.5	0.5	2.3	16.0	38.0

Table 3.20 (continued)

Species	Status	Alt.	Forest Activity: Harvest	Forest Activity: Thinning	Forest Activity: Watershed Restoration	Forest Activity: Prescribed Burning	Range Activity: Livestock Management	Range Activity: Riparian Restoration
Steelhead trout								
	Strong							
		1	5.9	2.7	1.0	1.7	2.6	1.0
		2	1.4	2.7	1.4	1.7	7.8	1.0
		3	4.3	4.2	1.4	2.3	7.8	4.2
		4	4.3	4.5	3.2	7.0	7.8	33.0
		5	4.3	4.2	2.8	4.9	5.0	33.0
		6	1.7	4.5	2.8	6.6	7.8	33.0
		7	1.4	2.7	1.0	1.7	13.9	15.4
	Depressed							
		1	6.2	2.7	1.4	2.3	7.4	1.1
		2	2.7	2.0	3.0	2.3	12.0	1.1
		3	4.2	3.3	3.0	5.3	10.8	20.7
		4	4.2	4.8	4.6	8.3	12.0	35.6
		5	4.3	3.8	3.6	5.7	11.3	17.0
		6	2.3	4.3	3.6	7.0	13.3	25.1
		7	1.8	2.0	1.4	3.3	15.0	6.1
	Corridor							
		1	4.5	1.8	1.0	1.7	6.2	1.1
		2	2.3	1.2	2.3	1.7	10.8	1.1
		3	2.9	2.3	0.0	0.0	9.9	11.7
		4	2.9	3.6	3.3	5.8	0.0	35.6
		5	3.3	2.6	2.4	4.1	10.2	23.2
		6	1.9	3.1	2.5	4.8	11.8	30.3
		7	1.3	0.0	1.0	3.0	15.0	14.4
Stream-type chinook salmon								
	Strong							
		1	9.0	4.5	1.5	2.5	6.0	1.2
		2	2.0	4.5	1.5	2.5	12.5	1.2
		3	7.0	7.0	1.5	2.5	12.5	33.4
		4	7.0	7.0	4.0	10.0	12.5	38.0
		5	7.0	7.0	4.0	7.0	11.8	19.6
		6	2.5	7.0	4.0	10.0	12.5	19.6
		7	2.0	4.5	1.5	2.5	16.0	15.0
	Depressed							
		1	6.3	2.6	1.5	2.5	8.1	1.1
		2	2.7	2.1	3.4	2.5	12.1	1.1
		3	4.2	3.2	3.4	5.9	11.0	20.6
		4	4.2	4.8	5.1	9.3	12.1	34.1
		5	4.3	3.6	3.9	6.0	11.7	12.8
		6	2.5	4.4	3.9	7.5	13.4	22.8
		7	2.0	2.1	1.5	3.3	14.3	4.0
	Corridor							
		1	5.0	2.1	1.1	1.9	6.3	1.1
		2	2.5	1.5	2.6	1.9	10.9	1.1
		3	3.3	2.5	2.9	5.1	9.6	15.4
		4	3.3	3.9	3.8	6.6	12.4	35.8
		5	3.5	2.9	2.8	4.4	10.3	23.2
		6	2.1	3.4	2.9	5.4	12.4	30.8
		7	1.5	2.1	1.1	3.1	15.1	11.4

Table 3.20 (continued)

Species	Status	Alt.	Forest Activity: Harvest	Thinning	Watershed Restoration	Prescribed Burning	Range Activity: Livestock Management	Riparian Restoration
Ocean-type chinook salmon								
	Strong							
		1	6.5	2.7	1.3	2.1	8.6	1.2
		2	2.5	2.1	2.7	2.1	12.6	1.2
		3	4.3	3.4	2.7	4.6	12.4	8.6
		4	4.3	5.0	4.4	7.8	12.6	38.0
		5	4.3	3.9	3.4	5.9	10.5	18.9
		6	2.1	4.5	3.4	6.7	12.9	32.1
		7	1.7	2.1	1.3	3.0	16.0	4.1
	Depressed							
		1	6.2	2.4	1.3	2.1	7.4	1.2
		2	2.6	2.1	2.4	2.1	11.4	1.2
		3	3.9	3.8	2.4	4.2	10.4	11.0
		4	3.9	5.1	4.1	7.6	11.4	38.0
		5	4.8	3.8	2.8	5.4	11.0	25.6
		6	2.7	4.8	3.1	6.5	12.5	38.0
		7	1.7	1.8	1.3	3.7	16.0	17.8
	Corridor							
		1	3.8	1.8	0.7	1.1	3.8	1.1
		2	2.4	1.1	1.2	1.1	9.5	1.1
		3	2.8	2.6	1.2	2.1	8.7	13.0
		4	2.8	3.2	1.6	3.2	9.5	34.8
		5	3.6	2.9	1.2	2.5	9.5	28.1
		6	1.8	2.6	1.6	3.2	10.5	28.1
		7	0.9	0.7	0.7	3.2	14.6	22.9
	Fringe							
		1	6.8	2.7	1.4	2.3	8.7	1.2
		2	2.6	2.1	3.1	2.3	12.1	1.2
		3	4.3	3.3	3.1	5.4	11.8	11.5
		4	4.3	5.2	5.1	8.6	12.1	38.0
		5	4.3	3.8	3.7	6.4	12.1	21.8
		6	2.3	4.7	3.7	7.2	12.4	38.0
		7	1.8	2.1	1.4	3.2	16.0	20.3

We assumed that risks were greatest and benefits least if activities were not clearly tied to the implementation of watershed/ecosystem analysis. Watershed and riparian restoration activities are more likely to be efficiently and effectively focused if they are associated with a broad-scale analysis and are not merely mitigation tacked onto site- and project-specific activities. We also assumed risks were greater if the associated riparian conservation strategy was inadequate as considered in the first step of this analysis.

We recognize the potential benefits of prescribed fire in restoring the structure and function of terrestrial ecosystems, but were not able to evaluate species benefits in our analyses. We generally assumed the effects of prescribed fire activities to be benign.

In our discussion of alternatives, we considered the magnitude of an activity relative to the range of activities projected across a species distribution and among alternatives. For example, combined

timber and thinning activities were considered low when less than 5 percent of the species/status distribution was potentially influenced per decade, and high when 10 percent or more was affected. The allocation of activities in sensitive areas was also considered. For example, high levels of timber harvest and low levels of restoration in the fringe distribution of species (largely represented by depressed and highly-fragmented populations) were viewed negatively.

Framework for Judging Alternatives

We used a series of eleven questions to explore the potential effect of each alternative on focal fish species (table 3.21). Questions 1 to 5 were addressed on a species-by-species basis. For Questions 6 to 11, however, the evaluation team decided that the answers applied to all species. We used the discussion generated by each question to formulate the findings discussed in the next section, but did not attempt to systematically craft an answer to each question for each species that reflected the range of opinions expressed in the discussion.

Findings by Species

We begin each of the following sections with a brief overview of the current status of each salmonid species, as described by Lee and others (in press). We then provide a synoptic report on the expected effect of each alternative, followed by a brief comparative summary of all the alternatives.

Table 3.21. General questions used to guide the discussion of possible effects from each of the seven proposed alternatives on widely-distributed salmonids.

Does the alternative:

(1) Conserve core areas of (relatively) high population density within the species' range?

(2) Identify at-risk areas and use those areas to prioritize restoration and management prescriptions?

(3) Decrease fragmentation of aquatic habitats and maintain/restore corridors as critical components of connectivity among populations?

(4) Maintain, protect, and/or restore proper functioning conditions of riparian habitats within the range of this species?

(5) Address other specific threats to this species?

(6) Emphasize the uncertainty of restoration treatments and provide a framework for adaptive management as better information is available to judge treatment results?

(7) Attempt to minimize the effects of introduced species?

(8) Adequately protect aquatic habitats within the range of this species from increased sedimentation associated with land-use activities?

(9) Maintain, protect, and/or restore water quality within the range of this species?

(10) Maintain, protect, and/or restore water quantity within the range of this species?

(11) Address the importance of non-Federal lands to conservation and restoration strategies?

Bull trout *(Salvelinus confluentus)*

Bull trout currently occur in approximately 45 percent of the subwatersheds comprising the potential historical range. Although they are distributed broadly throughout the potential range and the assessment area, the current distribution is patchy. Bull trout are classified as strong in 6 percent of the potential range. Approximately 50 percent of those strong populations are contained within or associated with wilderness areas. Many remaining populations are believed to be fragmented and relatively isolated, either through the loss of migration corridors or the disruption of suitable habitat networks (Lee and others, in press). These populations may be at risk even with no further habitat loss. Because approximately 93 percent of the strong subwatersheds and 76 percent of the depressed-status subwatersheds are on Federal land (table 3.12), and because bull trout appear to be particularly sensitive to land-use effects (Lee and others, in press), future management of FS- and BLM-administered lands will play a major role in the trends and distribution of bull trout within the assessment area.

Alternative 1—Under Alternative 1, we expect bull trout populations to decline throughout much of their current range. The strong populations associated with wilderness areas may be influenced relatively little, but the remaining distributions will be subject to moderate and high levels of timber harvest and thinning activities (table 3.20), and new road construction. The number of subwatersheds with low-road densities or no roads that support spawning and rearing are projected to decline, while the number of subwatersheds with high road densities should increase (table 3.11). Results of the classification tree analysis suggest a decline in the frequency of both strong and depressed populations (tables 3.3 and 3.4). Without adequate protection of riparian function (described in "Step 1" section of this chapter) and with relatively limited watershed restoration (table 3.20), we have little reason to believe that these negative trends will be mitigated. Declines in the status and distribution of bull trout should be most pronounced within areas which emphasize commodity production; these areas include portions of the Blue Mountains, the Southern Cascades, and the Upper Klamath reporting units of the EEIS planning area, and the Northern Glaciated Mountains, Lower Clark Fork and Upper Clark Fork units in the UCRB planning area. Continued declines in the fringe distributions are anticipated because activities in that area are expected to be as high or higher than in other portions of the range, and because these parts of the range are not represented by any strong populations. The loss of the fringe populations could represent a disproportionate loss of genetic variability for this species. Bull trout are most likely to persist within the Central Idaho Mountains, the South Fork Flathead subbasin with a conservation emphasis, and in wilderness areas in the Northern Cascades.

Alternative 2—Bull trout are provided increased protection under the Inland Native Fish Strategy (INFISH) (1995), the implementation of ecosystem analysis, and relatively low or moderate levels of timber harvest and thinning activity (table 3.20) under Alternative 2. Much of the high quality habitat associated with strong populations in priority watersheds should be protected by the standards that apply therein. Increased watershed restoration should also reduce the risk to some strong populations. The projected distribution of road densities associated with bull trout habitats (table 3.11), however, suggests little increase in the frequency of subwatersheds with no roads or very low road densities. The models also predict a minor decline in occurrence of strong, or of strong and depressed populations (tables 3.3 and 3.5). More limited watershed restoration, a relative lack of riparian restoration activity in the fringe portion of the existing range (table 3.20), and a production-conservation emphasis in the rangelands associated with the fringe distribution suggest potential decline of these populations. With the emphasis on bull trout in the INFISH conservation strategy, we expect bull trout to persist throughout much of the current distribution of strong populations. We do not anticipate extensive rebuilding of habitat networks, however.

Because of the existing fragmentation and isolation of some populations, particularly those outside central Idaho and in the fringe distributions, some populations may face elevated risk of extinction through natural disturbance events, even without further habitat loss.

Alternative 3—Under Alternative 3, much of the current distribution of strong populations of bull trout will likely be conserved. It is unclear whether significant rebuilding of the population will occur, however, and we are concerned that the fringe distribution will be further eroded. Road-density reductions are projected across the bull trout distributions (table 3.11), and model predictions suggest an increasing trend in the occurrence of strong subwatersheds (tables 3.3 and 3.6). Because of the emphasis on ecosystem analysis in Category 1 (see footnote 4 for definition) and strong subwatersheds, and a moderate level of watershed restoration in the strong distribution, we anticipate that the core of the bull trout distribution associated with the Central Idaho Mountains and eastern fringe of the Northern Glaciated Mountains in the UCRB area, and the Northern Cascades and Blue Mountains of the EEIS area will be conserved if not strengthened. Model projections, however, suggest a decline in the complete distribution (strong and depressed) that implies further declines in some portions of the range (tables 3.3 and 3.6). Because ecosystem analysis will not be required in depressed subwatersheds outside of Category 1 subbasins or priority areas, a general decline rather than rebuilding of habitat networks outside these core areas may occur. The risks could be exaggerated in the fringe distribution areas because of relatively high timber and thinning activity, and little watershed restoration (table 3.20). Relatively intensive riparian restoration activities could provide some benefits for bull trout populations in the rangeland portions of the fringe distributions. However, benefits are more likely in corridors than in spawning and rearing habitats. Because critical spawning and initial rearing habitats for bull trout tend to be limited to higher-elevation portions of the occupied watershed, particularly on the southern limits of the range associated with the fringe, activities on the forestlands are likely to be far more important compared to rangelands.

Alternative 4—The core distributions of bull trout associated with Category 1 watersheds will likely be conserved and perhaps strengthened under this alternative. Some rebuilding in more fragmented or depressed portions of the range is likely, but large improvements are not expected. The active restoration associated with this objective provides a relatively high level of watershed restoration and road-density reduction. Road-density projections show positive trends associated with both the strong and complete distribution of bull trout populations (table 3.11). Model predictions also suggest a relatively strong positive trend in the occurrence of strong subwatersheds (tables 3.3 and 3.7). Although timber and thinning activities are relatively high in the subbasins supporting strong populations, watershed restoration is also increased (table 3.20). Because of the emphasis on ecosystem analysis in Category 1 and stronghold watersheds, there should be an opportunity to prioritize forest and watershed restoration efforts in areas representing the least risk and greatest benefit for important bull trout populations. Projected and anticipated trends on the fringe and less prominent portions of the bull trout distributions are less encouraging. Model predictions suggest a moderate decline in the occurrence of the complete distribution of spawning and rearing subwatersheds (strong and depressed) (tables 3.3 and 3.7). Timber harvest and thinning activities are also anticipated to be higher in the depressed and fringe portions of the distribution than in the strong subwatersheds (table 3.20). Although watershed restoration activity is still projected to be relatively high in these latter subbasins, the lack of ecosystem analysis outside the Category 1 subbasins or strong subwatersheds suggests that prioritization of activities may not effectively mitigate the inherent risks associated with increased forest restoration and timber harvest activity.

Alternative 5—Under Alternative 5, we anticipate declines in the distribution and status of bull trout populations in major portions of both the

EEIS and UCRB areas. The core of the bull trout distributions associated with the Category 1 and aquatics-emphasis watersheds should fare well under this alternative. A substantial amount of wilderness, the emphasis on ecosystem analysis, and restoration focused to benefit strong populations (see Alternative 4), will likely sustain and perhaps expand the distribution of bull trout within these select subbasins (Category 1, and Forest Clusters 1 and 2). The emphasis on commodity production and the lack of ecosystem analysis in major portions of the species range, however, suggest that other populations will not do well. Although activity projections imply moderate or high levels of watershed restoration under this alternative (table 3.20), we anticipate inadequate protection or restoration of riparian function and aquatic ecological processes where riparian protection standards are relaxed (see "Step 1" section of this chapter). The model predictions of a general decline in the occurrence of both the strong and combined distributions (tables 3.3 and 3.8) are not likely to be mitigated in areas with increased activity and road construction. We anticipate a definite decline in the distributions in the northern Idaho and western Montana portions of the UCRB area and in the Blue Mountains and Upper Klamath regions of the EEIS area. The Upper Klamath represents a major portion of the fringe distribution of this species; losses here could mean a disproportionate loss of genetic variability for bull trout.

Alternative 6—Alternative 6 would probably conserve and perhaps strengthen the core of the bull trout distribution in strong populations. Decreasing trends in road density are predicted within the strong and depressed subwatersheds (table 3.11). The models also predict a relatively strong positive trend in the occurrence of strong populations (tables 3.3 and 3.9). Projected timber and thinning activities within the strong distributions are moderate, but an emphasis on watershed restoration is retained (table 3.20). The emphasis on ecosystem analysis within Category 1 and strong population areas and the additional emphasis on monitoring and adaptive management implied by this alternative also suggest a substantial opportunity to focus management activities in a manner that represents the least possible risk for many of these populations. We are unsure about the likely trends in bull trout populations in the remaining portions of the distribution. Subwatersheds supporting depressed populations of bull trout outside the Category 1 subbasins will not necessarily receive the consideration afforded by ecosystem analysis. Although some erosion of the current distribution of depressed and fringe populations might occur, lower levels of timber harvest and thinning activity and the moderate emphasis on watershed restoration in both the depressed and fringe distributions might allow successful restoration of some subwatersheds (table 3.20). Road density projections suggest substantial road reductions may occur in some of the depressed subwatersheds (table 3.11), while model projections suggest essentially no change in the combined distributions (tables 3.3 and 3.9).

Alternative 7—Alternative 7 provides a substantial opportunity for conservation and restoration of bull trout status and distributions throughout the EEIS and UCRB planning areas. Decreasing trends in road density are predicted within both the strong and depressed subwatersheds (table 3.11). Although watershed restoration activities are low, timber harvest and thinning activities are also low (table 3.20). Model predictions represent the strongest positive trends observed across any of the alternatives for both the strong and combined distributions (tables 3.3 and 3.10). Important caveats to these apparent positive responses include the risks represented by the lack of both forest and watershed restoration under this alternative. The legacy of historical management activities may place systems without active restoration at risk. These risks are likely to be most important in the more fragmented portions of the range where bull trout persist, and in relatively small and isolated remnants of the historical habitat network that will not be included in reserves. This would be a particularly relevant concern for the fringe portions of this species' range. We anticipate that the projected response in the core of the species distribution associated with strong subwatersheds would not be substan-

tially slowed by these problems. It is unclear whether these risks are enough to negate the apparent positive trend in the more depressed portions of the range.

Summary—Bull trout populations appear to be depressed throughout most of their current distribution. Despite the relatively poor condition, they retain a wide distribution. An important part of the remaining strong distribution is found within wilderness areas around the Basin and will likely persist under most alternatives. The largest, most secure portion of the distribution is found in the Central Idaho Mountains. Alternatives 2, 3, 4, 6, and 7 would likely conserve the cores of the bull trout distribution while Alternatives 1 and 5 would not (table 3.22). None of the alternatives provide for extensive rebuilding in the more depressed parts of the range. Alternatives 3, 4, 6, and 7 provides some potential for active restoration that could benefit depressed bull trout populations, but it is not clear that the analysis and planning necessary to effectively and efficiently prioritize those efforts will exist. None of the alternatives provides strong protection or emphasis for restoration of what may be a particularly important fringe distribution. Furthermore, none of the alternatives provides strong guidance or an opportunity for securing or restoring migratory corridors that exist outside of Federal lands, which may seriously isolate some populations.

Westslope cutthroat trout *(Oncorhynchus clarki lewisi)*

Westslope cutthroat trout are broadly distributed in the northern portion of the UCRB planning area, but are restricted to the Northern Cascades and a small portion of the Blue Mountains in the EEIS planning area. The latter area represents a relatively isolated group that is considered in the fringe of the distribution. This subspecies of cutthroat trout remains one of the most widely distributed salmonids in the assessment area; it is still found in approximately 85 percent of the potential historical range. Although they persist widely, most populations have declined in status. Strong populations are believed to exist in about 22 percent of the potential historical range, 40 percent of which is associated with wilderness. Introgression and competition with introduced salmonids, fishing, and habitat disruption are believed to be important factors contributing to the depressed condition of most populations. Road density and land management classification were useful variables in classification and prediction of westslope cutthroat trout distributions (Lee and others, in press). The broad distribution of westslope cutthroat trout within the historical range and the persistence of populations in some heavily managed watersheds demonstrate that local extinctions have not been widespread. Although populations may persist in the face of extensive, human-caused disturbance, many exist only in low numbers or as restricted, resident populations that reflect little of the diversity and production of historical populations. Because approximately 70 percent of the current distribution and 93 percent of the remaining strong distribution are found on FS- and BLM-administered lands (table 3.13), forest and rangeland management is likely to play an important role in the future distribution and status of this subspecies.

Alternative 1—Westslope cutthroat trout will likely persist throughout much of their current distribution under this alternative, but a continued decline in status throughout a major part of that distribution is anticipated. Some of the more restricted populations may disappear. High levels of timber harvest and thinning activities are projected throughout a major portion of the species range, with little emphasis on watershed or riparian restoration (table 3.20). Road densities are expected to increase across the species' range (table 3.11). The models predict a relatively strong declining trend in the occurrence of strong populations, and a lesser negative trend in the complete distribution (tables 3.3 and 3.4). Current Forest plans are likely to provide a variable level of protection for these populations. The general emphasis on timber production throughout much of the range, a lack of mid-scale analysis to focus activities and minimize risks in particularly important or sensitive populations, and the general lack of a consistent riparian protection strategy suggest that

the projected declines are unlikely to be mitigated (see "Step 1" section of this chapter). Because an important core of the remaining strong westslope cutthroat trout populations is associated with wilderness areas in the UCRB and to a lesser extent in the North Cascades portion of the EEIS planning areas, some strong populations will persist across the analysis area. Because westslope cutthroat trout tend to persist even in some heavily managed areas, they are likely to persist throughout much of their current distribution. More populations, however, may be limited to remnant status dominated primarily by resident forms, low densities, and potentially high levels of genetic introgression. A decline in status seems most likely in the timber-emphasis areas of the UCRB area, predominantly in northern Idaho and Montana. The fringe distribution in the Blue Mountains of the EEIS area may also be particularly vulnerable. Because relatively few productive subwatersheds remain in this area, further losses could represent an important loss of genetic variability for the subspecies.

Alternative 2—The INFISH strategy, focused in priority watersheds and low and moderate land-disturbing activities, could protect much of the core of the westslope cutthroat trout distribution under this alternative. We do not anticipate important rebuilding, but distributions and status should not decline dramatically outside of the species fringe in the EEIS planning area. In general, we anticipate that strong populations associated with wilderness and a conservation emphasis in the Central Idaho Mountains and northeastern Montana of the UCRB area, and in the North Cascades of the EEIS area will maintain their current condition. Increased activity, including both commodity production and increased efforts for restoration, may produce mixed results for the remaining populations scattered throughout much of northern Idaho and Montana in the UCRB. Road-density projections suggest little change in the overall distributions associated with strong subwatersheds outside of wilderness (table 3.11), but the models predict a moderate, declining trend in the frequency of occurrence for these same areas (tables 3.3 and 3.5). An emphasis on riparian protection associated with INFISH standards could mitigate this trend in priority watersheds. Because westslope cutthroat seem to persist even with moderate levels of disturbance, a significant opportunity for restoration of strong populations exists throughout much of the range. The moderate level of restoration associated with the distribution of strong subwatersheds (table 3.20) could work to secure watersheds that are at risk and might rebuild adjacent depressed systems. We are less optimistic that important restoration will occur in depressed portions of the range that are not associated with strong populations or priority subbasins. Relatively little watershed restoration activity is projected in association with the depressed or fringe distributions for this subspecies (table 3.20), and INFISH riparian protection standards would not result in rapid recovery of watershed conditions where disturbances have been extensive. Although a rapid loss of populations is not anticipated in the depressed and fringe portions of the range, any erosion of the fringe could be an important loss of genetic variability for the subspecies.

Alternative 3—Alternative 3 should conserve and perhaps slightly expand the distribution of subwatersheds supporting strong populations of westslope cutthroat trout. We do not anticipate strong rebuilding in the more fragmented and depressed portions of the subspecies range, although road-density projections show overall decreasing trends in both the strong and depressed distributions (table 3.11). Model predictions also suggest a positive trend in the frequency of strong populations (tables 3.3 and 3.6). Although timber harvest and thinning activities are moderate in the subbasins supporting strong subwatersheds, moderate watershed and riparian restoration (table 3.20) could secure some at-risk systems. Ecosystem analysis in Category 1 and all strong subwatersheds, and INFISH riparian standards, should protect sensitive watersheds. Those analyses should also provide an opportunity to prioritize timber harvest and restoration activities in a manner that secures or expands distributions by focusing activities in areas with the least risk and greatest potential gain through restoration.

Table 3.22. Projected effects of the seven proposed alternatives on bull trout.

Will the Alternative:	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
1. Conserve strong populations in the central or core portions of the species' range?	No	Yes	Yes	Yes	No	Yes	Yes
2. Prevent declines in habitats or populations throughout the entire species' range?	No	No	No	Uncertain	No	Uncertain	Uncertain
— if "no", where are declines most likely to occur (on FS/BLM lands)?	Outside wilderness and other protected areas	Forest Clusters 3 and 4, and fringe in rangeland	Mixed results across species' range	Category 2 and 3	Category 2 and 3; commodity-emphasis areas	Forest Cluster 4 and Flint Rock	Isolated remnants
3. Help rebuild depressed populations by restoring habitats?	No	Yes	Yes	Yes	Yes	Yes	Yes
— if "yes", where?		INFISH[1] Priority watersheds	Forest Clusters 2, 4, and 5	Mixed results across species' range	Category 1; Forest Cluster 1 and 2	Mixed results across species' range	
What is the role of factors other than habitat?	Competition and introgression with introduced fishes can seriously threaten depressed populations, particularly in degraded habitats, and may undermine efforts to rebuild populations in good habitats. Highly-fragmented and isolated populations may risk extirpations even with no further habitat loss.						

[1](INFISH) Inland Native Fish Strategy. 1995. Environmental Assessment: Decision Notice and Finding of No Significant Impact. Interim Strategies for managing fish-producing watersheds in eastern Oregon and Washington, Idaho, western Montana, and portions of Nevada. [Place of publication unknown]: U.S. Department of Agriculture, Forest Service, Intermountain, Northern, and Pacific Northwest Regions. [irregular pagination].

We anticipate that any gains will be most prominent in the areas associated with the conservation and restoration emphasis in the Central Idaho Mountains and northeastern Montana within the UCRB planning area. We are less optimistic that positive changes in status will occur in the depressed subwatersheds for westslope cutthroat trout outside of the Category 1 subbasins. A positive trend in road densities (table 3.11) and a small but a positive trend in model predictions for the entire distribution suggests that there will not be extensive erosion of the current distribution. Increased timber harvest and thinning activity without a comparable increase in watershed restoration, however, suggests that large net gains are unlikely. For depressed populations, INFISH standards should provide protection but are unlikely to lead to rapid recovery in watershed and habitat conditions. No gain and some erosion of depressed populations can be anticipated in the fringe distribution associated with the Blue Mountains in the EEIS area because of relatively high levels of timber harvest and thinning, and low levels of watershed restoration (table 3.20).

Alternative 4—Alternative 4 proposes increased active management. This suggests both risks and important opportunities for management that will influence the distribution of westslope cutthroat trout. We anticipate that the core distributions of strong populations will be conserved and potentially strengthened. Moderate levels of timber harvest but also some of the highest allocations of watershed restoration are projected for the currently strong subwatersheds (table 3.20). The relative magnitude of watershed restoration coupled with implied protection in ecosystem analysis suggests an opportunity to secure important, but potentially at-risk systems. Decreasing trends in road densities (table 3.11) and model predictions for the occurrence of strong subwatersheds (tables 3.3 and 3.7) in Forest Clusters 2, 3, and 4 add support. The requirement for ecosystem analysis in Category 1 and strong subwatersheds provides a mechanism to prioritize restoration and to focus timber harvest and thinning activities where they pose the least risk. Ecosystem analysis and extensive restoration might also allow an extension of some strong populations by focusing work in systems with the greatest potential to respond. Conservation and strengthening of the depressed distribution outside Category 1 subbasins may be less likely. Although moderate levels of watershed and riparian restoration are expected in subbasins supporting depressed and fringe populations, high levels of timber harvest and thinning activity are also predicted for these systems (table 3.20). The riparian protection measures associated with this alternative should conserve much of the distribution, but restoration of depressed populations will be less likely without the planning and prioritization of activities implied by ecosystem analysis. Because that analysis is not required outside the Category 1 and strong systems, it is not likely to occur throughout the depressed or fringe distribution of this subspecies. Implementation will produce varied results in restoration that we cannot anticipate. The potential for important gains is present, but we are uncertain whether they will be realized. A failure to secure or strengthen the limited fringe distribution within the EEIS area could result in an important loss of genetic variability for this subspecies.

Alternative 5—Under Alternative 5, we anticipate both positive and negative effects on the distribution and status of westslope cutthroat trout across the assessment area. Many of the strong subwatersheds for westslope cutthroat trout are associated with Category 1 subbasins outside of the areas proposed for timber or livestock emphasis in this alternative. Where ecosystem analysis is required, it should produce results similar to Alternative 4. In that respect, we expect Alternative 5 to conserve and perhaps strengthen portions of the core of the range. In contrast, important areas that support both strong and depressed westslope cutthroat are found in the proposed timber and livestock emphasis subbasins, where declines in status are expected. High levels of timber harvest and thinning throughout much of northern Idaho and western Montana increase the risk to the remaining strong popula-

tions in that region. Although moderate levels of watershed restoration activities are implied, we anticipate that they will be less effective than the ecosystem analysis and more conservative riparian protection measures proposed under other alternatives and conservation emphasis areas (see "Step 1" section of this chapter). The predicted loss of strong subwatersheds is likely to be focused in this region and may not be mitigated through the less conservative protection measures. We expect little restoration of the already depressed populations for much of the range. The road projections do not show decreasing trends (table 3.11) and the model projections for the complete distribution suggest no change (tables 3.3 and 3.8). High levels of timber harvest and thinning activities are not compensated by similar increases in watershed restoration in either the depressed or fringe distributions (table 3.20). Because much of the depressed and all of the fringe distributions are associated with a timber and range management emphasis and less conservative riparian protection, we do not expect any substantial improvement in habitat conditions. Some erosion of the current distribution might occur without active watershed restoration, especially in some of the more seriously restricted populations.

Alternative 6—As in several of the preceding alternatives, we expect cores of strong subwatersheds for westslope cutthroat trout to be conserved and potentially strengthened under this alternative. Road density projections show positive trends in the strong subwatersheds (table 3.11) and model projections suggest a moderate increasing trend as well (tables 3.3 and 3.9). The projection of moderate timber and thinning activities and moderate levels of watershed restoration suggest an opportunity to focus work to secure at-risk systems and perhaps rebuild those with important potential. The requirement for ecosystem analysis throughout the Category 1 and all strong subwatersheds and the additional emphasis on adaptive management implied in this alternative provide a mechanism that should encourage progress. We remain uncertain about the trends for depressed populations outside the Category 1 subbasins. Subwatersheds that do not support strong populations may not have the benefit of ecosystem analysis. A moderate allocation of watershed restoration associated with the distribution of depressed populations provides an important opportunity for restoration of some populations. Positive changes in road densities (table 3.11) and predictions of modest but increasing trends in the complete distribution (tables 3.3 and 3.9) also suggest restoration of some populations. An effective and efficient prioritization of restoration activities may not occur, however, without the commitment to ecosystem analysis. This alternative also appears to provide the best opportunity for restoration of the depressed populations associated with the fringe of the range. Limited timber harvest activities and a strong emphasis on watershed and riparian restoration associated with these subwatersheds (table 3.20) provides a unique opportunity to protect these important fringe populations.

Alternative 7—Our analyses support positive trends in the distribution and status for westslope cutthroat trout under Alternative 7. There are strong positive trends projected in road densities (table 3.11) and similarly optimistic predictions in the occurrence of strong populations from the models (tables 3.3 and 3.10). These patterns, together with relatively low levels of land disturbing activities in strong subwatersheds, suggest that the core of strong populations throughout the assessment area should be conserved and strengthened under this alternative. These patterns suggest benefits for depressed populations as well, but the lack of active watershed restoration makes us less certain about those gains. Much of the depressed distribution for westslope cutthroat trout is associated with moderately and heavily roaded watersheds (table 3.11). Although strict riparian protection standards should minimize further degradation in these systems, many watersheds may not recover without active road obliteration or other efforts to restore the watershed, hydrologic, and riparian processes needed to create and maintain complex and productive habitats.

Summary—Westslope cutthroat trout are likely to persist throughout most of their current distribution under any of the alternatives. The distribution and status of healthy populations, however, could be strongly influenced by the management associated with the range of alternatives. We would anticipate further decline in the status of the species under Alternative 1. Although Alternative 5 would likely conserve much of the core of strong populations in the current range, we would expect declines of healthy populations in the UCRB area under this alternative. Alternatives 2, 3, 4, 6 and 7 all appear likely to conserve most of the strong populations across the assessment area (table 3.23). Alternatives 3, 4, 6, and 7 may offer some potential for strengthening those cores through expanded watershed restoration and the prioritization of restoration and conservation activities through ecosystem analysis and/or the reduction of land-disturbing activities. We do not anticipate restoration of many currently depressed populations under Alternatives 2 and 3. Increased emphasis on active restoration under Alternatives 4 and 6 provides an opportunity for some progress toward restoring depressed populations. A lack of commitment to the analysis necessary to effectively focus and prioritize conservation and restoration efforts, however, may limit that potential. None of the alternatives assure conservation and restoration of the depressed populations associated with the fringe of the subspecies range in the EEIS planning area.

Yellowstone cutthroat trout *(Oncorhynchus clarki bouvieri)*

Yellowstone cutthroat trout have the narrowest distribution of any of the key salmonids, having formerly occupied about 8 percent of the Basin. Their range is restricted to the UCRB planning area in the Snake River drainage upstream from Shoshone Falls, Idaho. Yellowstone cutthroat trout currently persist in about 66 percent of the potential historical range. Despite their narrow distribution, the species was judged to support the largest proportion of strong populations of any key salmonid. Within the potential historical range, 32 percent of the populations were listed as strong. Introgression with introduced rainbow trout and cutthroat trout poses serious threats, however, and may weaken some populations identified as strong.

Management of FS- and BLM-administered lands is key to the survival of Yellowstone cutthroat trout; 57 percent of strong populations and 48 percent of depressed populations occur on these lands (table 3.14). An additional 13 percent of the strong populations occur within Teton National Park, Wyoming. A total of 35 percent of the strong populations are within designated wilderness or National Parks. The current range of Yellowstone cutthroat trout includes both forest and rangelands. Activities in both land types will affect the species' persistence.

Alternative 1—Management under Alternative 1 will likely contribute to declines in Yellowstone cutthroat trout outside of designated wilderness areas and National Park Service-administered lands. Although individual Forest plans may provide some levels of site-specific protection and restoration for important local stocks, this alternative lacks a consistent conservation and restoration approach. Populations outside of National Parks and designated wilderness will be affected by increased timber harvest, thinning, and road construction (table 3.20). The number of subwatersheds with high road densities is expected to increase (table 3.11). Models predict a decline in the species distribution and in strong populations (tables 3.3 and 3.4), especially in the Palisades and Salt River subbasins. Very little watershed restoration is planned under this alternative. Within rangelands, Alternative 1 provides little improvement in livestock management and very little planned riparian restoration (table 3.20). Declines will likely be most pronounced in areas managed most intensively for timber and range commodity production.

Table 3.23. Projected effects of the seven proposed alternatives on westslope cutthroat trout.

Will the Alternative:	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
1. Conserve strong populations in the central or core portions of the species' range?	No	Yes	Yes	Yes	No	Yes	Yes
2. Prevent declines in habitats or populations throughout the entire species' range?	No	No	No	No	No	Uncertain	Yes
— if "no", where are declines most likely to occur (on FS/BLM lands)?	Outside wilderness and other protected areas	Outside INFISH[1] Priority watersheds; Forest Clusters 3, 4, and 5	Category 2 and 3; Forest Clusters 3 (western MT) and 4, and Upper Clark Fork	Category 2 and 3; Western MT	Category 2 and 3; commodity-emphasis areas		
3. Help rebuild depressed populations by restoring habitats?	No	No	Yes	Yes	No	Yes	Yes
— if "yes", where?			Forest Cluster 2 and some of 4	Category 1; Forest Clusters 2, 3, and 4		Mixed results across species' range	
What is the role of factors other than habitat?	Competition and introgression with introduced fishes can seriously threaten depressed populations, particularly in degraded habitats, and may undermine efforts to rebuild populations in good habitats.						

[1](INFISH) Inland Native Fish Strategy. 1995. Environmental Assessment: Decision Notice and Finding of No Significant Impact. Interim Strategies for managing fish-producing watersheds in eastern Oregon and Washington, Idaho, western Montana, and portions of Nevada. [Place of publication unknown]: U.S. Department of Agriculture, Forest Service, Intermountain, Northern, and Pacific Northwest Regions. [irregular pagination].

Alternative 2—Alternative 2 will likely result in continued declines in Yellowstone cutthroat trout outside of designated wilderness areas and National Park Service-administered lands. Although some increased protection of watersheds may be afforded, land-disturbing activities will continue in important core areas and there is minimal emphasis on restoration of degraded areas. Increased protection is afforded under the application of INFISH guidelines that would require watershed analysis if standards were to be altered. Important core areas are not clearly identified under this alternative. Land-disturbing activities including harvest and thinning are relatively low (table 3.20), and minimal changes in road densities are expected (table 3.11). Models sensitive to road densities predict no change in the probability of populations (tables 3.3 and 3.5). The alternative identifies riparian areas and landslide-prone areas, but at-risk populations or habitats that may require added emphasis are not identified. There is little emphasis on restoration of depressed habitats. For depressed populations in rangelands, there is a high emphasis on livestock production, a low emphasis on riparian restoration, and moderate increases in livestock management (table 3.20). Consequently, currently degraded habitats may be degraded further and other areas may not receive the restoration effort needed to reverse population declines.

Alternative 3—It is uncertain whether Alternative 3 will improve overall conditions for Yellowstone cutthroat trout, although most important core areas should be protected. This alternative identifies important core areas by listing subbasins that support important strongholds under a Category 1 designation, and it applies emphasis to other strongholds outside Category 1 areas. There is little emphasis on prioritization of restoration in degraded areas. Similar to Alternative 2, some increased protection is afforded under the application of INFISH guidelines that would require watershed analysis for standards to be altered. Minor changes in road densities are anticipated (table 3.11) and the model predicts virtually no change in the occurrence of populations except for a small improvement in the Palisades subbasin (tables 3.3 and 3.6). Although thinning is projected in Clusters 5 and 6 as part of this alternative, most of this activity will be in forest types other than the cold forest which dominates the range of Yellowstone cutthroat trout. Within rangelands, riparian restoration is increased, livestock management improves moderately, and there are small Animal Unit Month (AUM) reductions for depressed populations (table 3.20).

Alternative 4—Alternative 4 should adequately protect core areas for Yellowstone cutthroat trout and provide modest improvement in depressed areas through watershed and riparian restoration. This alternative identifies important core areas by designating Category 1 subbasins that support important strongholds, and emphasizes other strongholds outside Category 1 areas. Road densities decrease in the more highly roaded subwatersheds within the range of depressed populations, and do not increase in watersheds supporting strong populations (table 3.11). The model predicts improved probabilities of all populations and strong populations in the Palisades, Salt, Lower Henrys, and Portneuf subbasins (tables 3.3 and 3.7). Thinning is projected in Clusters 5 and 6 as part of this alternative, again most of which will be outside the range of Yellowstone cutthroat trout. Within depressed populations in rangelands, restoration is emphasized in Range Cluster 6, livestock management improves moderately, and there are small AUM reductions (table 3.20).

Alternative 5—Alternative 5 is expected to exacerbate declines in the overall status of Yellowstone cutthroat trout in commodity-emphasis areas. Yellowstone cutthroat trout stocks overlap commodity-emphasis areas and will be subject to extensive land disturbance from timber harvest and livestock. Core areas outside of commodity-emphasis areas will be managed identically to Alternative 4. Areas with high road density would increase with this alternative (table 3.11) and the model predicts reductions in the distribution of the species and in strong populations (tables 3.3

and 3.8). High levels of harvest and thinning occur, especially in depressed population areas (table 3.20). Within commodity-emphasis areas, standards provide minimal protection of riparian areas, minimal ecosystem analysis, and there is no process to address cumulative watershed effects (see "Step 1" section).

Alternative 6—This alternative protects most core areas and applies a conservative and adaptive approach to restoration that should benefit Yellowstone cutthroat trout. Similar to Alternative 4, this alternative identifies most but not all important core areas by designating Category 1 subbasins that support important strongholds and emphasizing strongholds outside Category 1 areas. Timber harvest levels are low in all key areas, so risks are minimized. Road densities are reduced in some of the more highly roaded areas (table 3.11), which increases the likelihood of populations persisting in the Palisades, Lower Henrys, and Portneuf subbasins (tables 3.3 and 3.9). This alternative has a system of RMAs with stronger requirements for ecosystem analysis and whose widths are adjusted by slope. In rangelands, Alternative 6 has a moderate increase in livestock management and a large increase in riparian restoration (table 3.20).

Alternative 7—This alternative provides a system of reserves to conserve important core areas that, if extensive, would benefit Yellowstone cutthroat trout. Our analysis of Alternative 7 is incomplete because the EIS teams did not identify reserves within the Greater Yellowstone Ecosystem, which covers much of the range of Yellowstone cutthroat trout. We might assume that such reserves would build on existing National Parks and wilderness areas that harbor much of the core of the distribution. This alternative includes a combination of RHCAs, requirements for ecosystem analysis, and a cumulative-effects process that should protect core areas. This alternative has the lowest level of timber harvest and thinning (table 3.20). Road densities are expected to decline in the more highly roaded areas (table 3.11), which suggests a substantive increase in both species occurrence and strong populations (table 3.3). Increases would be expected in the Palisades, Upper and Lower Henrys, and Portneuf subbasins (table 3.10). Although restoration in forested areas is not emphasized, reduced human disturbance should benefit depressed populations. Within rangelands, this alternative includes a 50 percent reduction in AUMs, the largest increases in livestock management, and a moderate increase in active riparian restoration (table 3.20). These factors should benefit Yellowstone cutthroat trout in currently degraded rangeland habitats. As with other alternatives, it does not identify at-risk populations outside of strongholds. Unlike the other alternatives, it is much more comprehensive in addressing the influence of other factors such as mining, transport and storage of toxic materials, and water transfers.

Summary—Yellowstone cutthroat trout are likely to persist under all alternatives. All alternatives provide various levels of protection of core areas. The degree to which degraded habitats are restored best distinguishes the alternatives and leads to the more favorable ratings. Alternatives 4, 6, and 7 are expected to conserve core areas and move toward restoration of degraded habitats (table 3.24). Alternative 3 provides uncertain benefits to Yellowstone cutthroat trout; although some core areas are adequately conserved, many other areas will be affected by additional land-disturbing activities. Alternatives 1, 2 and 5 can be expected to exacerbate declines in Yellowstone cutthroat trout populations outside of specially protected areas.

Redband trout *(Oncorhynchus mykiss* ssp.*)*

Redband trout are the most widely distributed of the salmonids considered in this analysis. Redband trout occur in about 73 percent of the assessment area. Two general forms of redband were identified within the assessment area: one associated with the distribution of steelhead (sympatric redband) and a second outside the historical range of steelhead (allopatric redband).

Table 3.24. Projected effects of the seven proposed alternatives on Yellowstone cutthroat trout within the Basin.[1]

Will the Alternative:	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
1. Conserve strong populations in the central or core portions of the species' range?	No	No	Yes	Yes	No	Yes	Yes
2. Prevent declines in habitats or populations throughout the entire species' range?	No	No	Uncertain	Yes	No	Yes	Yes
— if "no", where are declines most likely to occur (on FS/BLM lands)?	Palisades, Salt River, and areas managed most intensively for timber and range commodities	Areas managed most intensively for timber and range commodities	Areas managed most intensively for timber and range commodities		Commodity-emphasis areas		
3. Help rebuild depressed populations by restoring habitats?	No	No	Yes	Yes	No	Yes	Yes
— if "yes", where?			Palisades	Palisades, Salt, Lower Henrys, and Portneuf		Palisades, Lower Henrys, and Portneuf	Palisades, Upper and Lower Henrys, and Portneuf
What is the role of factors other than habitat?	Competition and introgression with introduced fishes can seriously threaten depressed populations, particularly in degraded habitats, and may undermine efforts to rebuild populations in good habitats.						

[1]The Basin is defined as those portions of the Columbia River basin inside the United States east of the crest of the Cascades and those portions of the Klamath River basin and the Great Basin in Oregon.

Sympatric redband trout persist in about 69 percent of the potential historical range and allopatric forms persist in about 49 percent of the potential historical range.

Although the taxonomic status of redband trout is uncertain, studies suggest long-term isolation of allopatric forms with concomitant genetic differentiation among several populations in isolated basins (Behnke 1992, Berg 1987). Allopatric forms are distributed among a number of isolated subbasins that may represent several evolutionarily distinct lineages and thus important components of the genetic variability of the species. These groups are associated with the Wood and Kootenai Rivers in the UCRB area, and the Upper Klamath Basin and a complex of isolated subbasins in south central Oregon in the EEIS area (Goose Lake, Warner, Catlow Valley, and Harney) (Lee and others, in press). Because of their potentially unique characteristics, each of these groups may warrant identification as separate evolutionary units or subspecies (Williams and others 1989) and could be considered as part of the fringe distribution for the species. We consider the likely influences of alternatives on the broad distribution of redband trout in the next section. In later sections dealing with sensitive species, we also briefly consider effects specific to the Upper Klamath Basin and isolated subbasins in south-central Oregon.

Redband trout are generally believed to be resilient to disturbance and their persistence across the historical range supports this view. Most populations are believed to be depressed, however, and strong populations are thought to exist in only 9 to 17 percent of their historical range. About 55 percent of the current distribution occurs on Federal lands and 33 percent of that is found in subbasins dominated by rangelands (table 3.15). Management of FS- and BLM-administered lands and both timber harvest and grazing activities should play an important role in the distribution and status of this species. Because redband trout remain relatively widely distributed, active restoration of some habitats could play an important role in restoring or securing a stronger distribution.

<u>Alternative 1</u>—We anticipate further declines in the status and distribution of redband trout under this alternative. Moderate to high levels of timber harvest activities (table 3.20), and increasing road densities (table 3.11) are projected throughout the range. The model predictions suggest a declining trend in the distribution of strong populations (tables 3.3 and 3.4). Current Forest plans may provide varied levels of protection for both strong and depressed populations. The lack of a consistent riparian conservation strategy and the allocation of only low levels of watershed and riparian restoration activities (table 3.20), however, suggest increased disturbance and negative trends. Under this alternative there is an emphasis on commodity production for forestlands, rangelands, or both, in all of the subbasins supporting the fringe populations, suggesting a downward trend. Although redband trout are likely to persist and may even remain widely distributed under this alternative, we anticipate a significant loss in the status and distribution of strong populations, and a risk of compromising a significant part of the genetic variability for the species.

<u>Alternative 2</u>—Under Alternative 2 we anticipate that the status for much of the distribution of sympatric redband trout will be conserved in both the EEIS and UCRB planning areas. We expect that the distribution and status of the allopatric populations representing the species fringe will decline. Alternative 2 incorporates the INFISH strategy including watershed analysis and riparian conservation standards that should provide important protection for populations exposed to land management in priority watersheds. The distribution of sympatric redband populations overlaps strongly with bull trout and some westslope cutthroat trout that were the focus of the INFISH strategy, and with anadromous salmonids emphasized in PACFISH and FEMAT. For that reason many of the priority watersheds will convey some protection to redband trout as well. The additional protection could reduce the threats

associated with moderate or low levels of timber harvest and thinning activities (table 3.20) in the central and northern portions of the species range. Within the priority watersheds, many of the strong populations of redband trout in both analysis areas should be conserved. With only limited watershed and riparian restoration, however, we do not expect any important rebuilding in the depressed part of this distribution. For redband trout outside the priority watersheds, further declines in status should be anticipated. Losses may be particularly significant for the allopatric form. Moderate levels of timber harvest and a production/conservation emphasis for all rangelands associated with the allopatric populations suggest a potential for significant watershed disturbance. Because many of the populations in the fringe distributions are already depressed, there is little riparian or watershed restoration anticipated. Many of these populations may fall outside the riparian protections afforded to the priority INFISH watersheds, and we cannot expect any significant restoration. Further losses in the fringe populations could represent major losses in the genetic diversity of this species.

Alternative 3—The cores of strong sympatric redband trout populations on Forest Service-administered lands should be conserved under this alternative. It is unclear what the trends will be in the remainder of the range, particularly the allopatric form outside of INFISH priority subwatersheds. The requirement for ecosystem analysis in Category 1 and all subwatersheds supporting strong populations should provide protection for much of the distribution of sympatric redband trout in both analysis areas. However, relatively little watershed restoration is projected for forested lands supporting depressed populations (table 3.20). The potential lack of ecosystem analysis (outside Category 1 and strong subwatersheds) to effectively prioritize activities that do occur, indicates that little restoration of depressed populations could be expected in this part of the range. A large portion of the redband distribution is found in rangelands. The projection of relatively high riparian restoration activities for depressed fringe and strong subwatersheds (table 3.20) indicates a potential to secure existing strongholds and restore other areas to a more productive condition. The lack of ecosystem analysis to effectively prioritize conservation and restoration efforts and the produce/conserve emphasis on all of the rangelands associated with the southern portion of the species distribution could negate overall species gains.

Alternative 4—The cores of strong sympatric redband populations should also be conserved and possibly extended under this alternative. Although moderate levels of timber harvest and thinning activities are associated with this alternative (table 3.20), the requirement for ecosystem analysis and more conservative riparian conservation standards in strong and Category 1 watersheds could mitigate much of the disturbance. Results are less certain for areas outside of Category 1 and strong subbasins. Strong trends were not evident in either the road density projections (table 3.11) or the modeled probabilities (tables 3.3 and 3.7) but moderate or high levels of watershed and riparian restoration activities are projected across the species range (table 3.20). Those restoration efforts coupled with the ecosystem analysis will provide some opportunity to secure and extend the strongholds. By effectively prioritizing both forest and aquatic restoration activities to minimize risk in important watersheds, some gains could be made. A similar opportunity exists across the distribution of depressed and fringe populations where high levels of both watershed and riparian restoration are projected (table 3.20). The lack of Category 1 or many strong watersheds in this part of the species range, however, suggests that ecosystem analysis will not be required and might be omitted across much of the area. Without the framework to effectively focus conservation and restoration efforts, it is uncertain if significant gains can be made across much of the range of depressed and fringe populations.

Alternative 5—Although the core of the strong sympatric redband trout distribution should be conserved or even strengthened in the UCRB

area, we would expect a large part of that distribution in the EEIS area to seriously decline under this alternative. All of the fringe distribution associated with the allopatric form would be expected to decline in status as well. The requirement for ecosystem analysis, an aquatic conservation emphasis, and moderate or high levels of watershed and riparian restoration activities (table 3.20) should benefit redband trout in the central region of Idaho that lies outside commodity-emphasis areas. The opportunity to secure and extend the distribution of strong subwatersheds should be similar to that discussed under Alternative 4. An emphasis on timber or livestock production extends over most of the remaining portion of the strong distribution and over all of the fringe distribution for the allopatric form. Within these portions of the redband range a lack of ecosystem analysis to prioritize restoration activities, a less conservative riparian protection standards (see "Step 1" section for details), and higher levels of disturbance can be expected to contribute to declines in the existing distributions. We would anticipate some decline in the status and distribution of redband trout throughout much of this area. Models predict a reduced probability of occurrence for allopatric redband trout in the Williamson and Upper Klamath subbasins (tables 3.3 and 3.8). Any declines in the fringe distributions could represent losses in the genetic variability for this species.

Alternative 6—Similar to Alternative 4, the cores of strong sympatric redband populations should be conserved and perhaps extended under this alternative. This alternative has low levels of timber harvest and thinning activities (table 3.20). The requirement for ecosystem analysis, and more conservative riparian conservation standards in strong and Category 1 watersheds should protect most core areas. Results are less certain for areas outside of Category 1 and strong subbasins. Although high road densities were projected to decrease (table 3.11), no trends were evident in the modeled probabilities (tables 3.3 and 3.9). Moderate or high levels of livestock management, watershed restoration, and riparian restoration activities are projected across the species range (table 3.20). Those restoration efforts coupled with ecosystem analysis will provide some opportunity to secure and extend the strongholds. Although this alternative places less emphasis on forest and aquatic restoration activities than does Alternative 4, it also has less risk from land-disturbing activities (table 3.20). A similar opportunity exists across the distribution of depressed and fringe populations where high levels of both watershed and riparian restoration are projected (table 3.20). The lack of Category 1 or many strong watersheds in this part of the species range, however, suggests that ecosystem analysis will not be required and might be omitted across much of the area. Without the framework to effectively focus conservation and restoration efforts it is uncertain if significant gains can be made across much of the range of depressed and fringe populations.

Alternative 7—This alternative provides a system of reserves which conserve core areas. These reserves should be adequate to protect most of the core areas for both sympatric and allopatric forms. Exceptions are the Harney and Goose Lake subbasins where reserves will not include core areas for allopatric redband trout. This alternative includes a combination of RHCAs, requirements for ecosystem analysis, and a cumulative effects process that should conserve most strongholds. The alternative has the lowest level of timber harvest and thinning (table 3.20). The road densities have reductions in current high-density areas and increases in low- and moderate-density areas (table 3.11). The models predict small changes in the probability of occurrence with slightly improved occurrence in the Williamson and Upper Klamath Lake subbasins (tables 3.3 and 3.10). Although restoration in forested areas is not emphasized, reduced human disturbance should benefit depressed populations. Within rangelands, this alternative includes a 50 percent reduction in AUMs, the largest increase in livestock management, and a large increase in riparian restoration (table 3.20). These factors should benefit redband trout in currently degraded rangelands. This alter-

native also has more comprehensive coverage of other factors including mining, transport and storage of toxic materials, and water transfers.

Summary—Although redband trout are likely to persist under all of the alternatives, the degree to which strongholds (especially isolated allopatric populations on the fringe of the species range) are conserved varies across alternatives. Alternatives 4 and 6 are expected to conserve most remaining core areas and move toward restoration of some degraded habitats, although benefits are uncertain for fringe populations. Alternative 7 does the most extensive job of conserving habitats for redband trout, including fringe populations in rangelands, although core areas in the Harney and Goose Lake subbasins may remain at risk (table 3.25). Alternatives 2 and 3 conserve sympatric strongholds, but declines are expected in the allopatric form comprising the fringe of the species. Alternatives 1 and 5 are anticipated to contribute to continued declines in status and distributions of redband trout populations.

Steelhead *(Oncorhynchus mykiss mykiss)*

Steelhead formerly occupied approximately 50 percent of the subwatersheds in the Basin and were found in Ecological Reporting Units (ERUs) within both the UCRB and EEIS planning areas. Steelhead are extinct in approximately 54 percent of the historical range, primarily as a result of blocked access to historical habitats. Few healthy populations persist within the current range; 1.3 percent of the subwatersheds support strong populations. Wild fish unaltered by hatchery stocks are likely rare, and expected in only 10 percent of the potential historical range (Lee and others, in press). Steelhead are currently a Federal Candidate species for listing under the Endangered Species Act. We evaluated these alternatives on their own merit, regardless of potential future requirements for consultation under the ESA. Any additional requirements through Section 7 of the ESA would be expected to provide added protection for critical habitats. Management of FS- and BLM-administered lands could strongly influence the status and distribution of steelhead, because 70 percent of strong subwatersheds and 59 percent of depressed ones are located on FS- or BLM-administered land (table 3.16). Approximately 19 percent of the depressed populations occur in wilderness areas. Because so few strong populations persist, virtually all subwatersheds that sustain wild and naturally reproducing steelhead should be considered critical habitats for biological reasons. Steelhead are dependent on habitats in both forested areas and rangelands and activities in both categories will affect populations.

Because of their extensive migrations and diverse life histories, steelhead and other anadromous fishes are influenced by Federal land management in spawning and rearing areas and migration corridors, and by a large number of other factors that operate outside of Federal lands in freshwater, estuaries, and the ocean environment. About 68 percent of the migration corridors between freshwater spawning and rearing habitats and the ocean lie on private or tribal lands (table 3.16). The quality and connectivity of habitats in both mainstem rivers and smaller watersheds will likely influence the strength and persistence of remaining steelhead populations (Lee and others, in press). Recent declines in steelhead stocks can be attributed primarily to the construction and operation of mainstem dams on the Columbia and Snake Rivers (CBFWA 1990, Raymond 1988). Because of mortalities associated with the dams (IDFG and others 1990; Raymond 1979, 1988), only the most productive populations may retain the resilience to persist in the face of natural and human caused disturbance (Lee and others, in press). Any changes in the environment that influence survival and productivity of remaining steelhead populations, including improvements in spawning and rearing habitats and reduced mortality from fishing, predation, and mainstem passage, will improve chances for persistence in variable environments (Emlen 1995). Simply put, under current conditions in migrant survival, many steelhead populations are at serious risk.

Table 3.25. Projected effects of the seven proposed alternatives on redband trout.

Will the Alternative:	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
1. Conserve strong populations in the central or core portions of the species' range?	No	Yes	Yes	Yes	No	Yes	Yes
2. Prevent declines in habitats or populations throughout the entire species' range?	No	No	Uncertain	Uncertain	No	Uncertain	No
— if "no", where are declines most likely to occur (on FS/BLM lands)?	Outside wilderness and other protected areas	Allopatric form outside INFISH[1] priority areas, and Range Cluster 6	Allopatric form outside INFISH[1] priority areas, and Range Cluster 6	Category 2 and 3, and Range Cluster 6	EEIS and Wood and Kootenai; Range Cluster 6	Category 2 and 3, and Range Cluster 6	Western portion of Range Cluster 6; Harney and Goose Lake subbasins
3. Help rebuild depressed populations by restoring habitats?	No	Yes	Yes	Yes	Yes	Yes	Yes
— if "yes", where?	Mixed results across species' range depending on intensity of riparian restoration and livestock management activities.						
What is the role of factors other than habitat?	Competition and introgression with introduced fishes can seriously threaten depressed populations, particularly in degraded habitats, and may undermine efforts to rebuild populations in good habitats.						

[1](INFISH) Inland Native Fish Strategy. 1995. Environmental Assessment: Decision Notice and Finding of No Significant Impact. Interim Strategies for managing fish-producing watersheds in eastern Oregon and Washington, Idaho, western Montana, and portions of Nevada. [Place of publication unknown]: U.S. Department of Agriculture, Forest Service, Intermountain, Northern, and Pacific Northwest Regions. [irregular pagination].

The differences between populations that persist and those that are extirpated will be strongly influenced by the survival and productivity of the populations as they are influenced by freshwater spawning and rearing habitats. Without substantial improvement in migrant survival, conserving and restoring the quality of freshwater habitats may make an important difference in persistence for many of the remaining populations. In the short term, conservation and restoration of habitats directly associated with remaining populations will be most important. In the long term, assuming mainstem conditions are resolved, it will be necessary to conserve and restore broader networks to support the full expression of life histories and species (Lee and others, in press; Lichatowich and Mobrand 1995). To ensure persistence and rebuilding of stocks, conservation and restoration of habitat on Federal lands must work in concert with other factors affecting steelhead. Although conservation and restoration of freshwater habitats may make the critical difference in persistence of many stocks, such activities are not likely to substantially improve the distribution and abundance of steelhead without substantial improvements in survival outside of spawning and rearing areas.

In our analysis of alternatives for steelhead, we did not rely on the classification trees tied to road density to consider potential trends. As discussed earlier, the models were not as useful for predicting the likelihood of changes in the distribution of populations of anadromous salmonids as they were for resident salmonids (table 3.3). As Lee and others (in press) noted, there are several potential reasons why the models do not perform as well for the anadromous species. First, anadromous salmonids have extensive migrations and their widely-dispersed life stages, status, and distribution are influenced by factors within freshwater spawning and rearing areas, as well as by factors outside those areas. Although road density will influence the quality of freshwater spawning and rearing habitats, roads do not adequately reflect other factors (for example, mainstem passage, predation, harvest, and ocean conditions) that influence the survival of life stages that migrate from freshwater spawning and rearing habitats. Second, the model does not differentiate between wild and hatchery-supplemented anadromous fish stocks. In some heavily-disturbed subwatersheds with high road densities, remnant numbers of anadromous fish may be present only because of supplementation with hatchery-reared fish. Third, too few strong populations are present to relate their presence to road density. As a result, the classification trees do not adequately predict the influence of changes in road density across alternatives on the status of anadromous fish.

The scientific literature illustrates that the quality of freshwater spawning and rearing areas will influence the survival, condition, and distribution of juvenile anadromous salmonids (see for example Meehan 1991). There is little reason to anticipate that freshwater life stages of the anadromous forms will respond in substantively different ways than resident forms. Anadromous salmonids in many portions of the Basin overlap in distribution with resident salmonids including redband trout, bull trout, and westslope cutthroat trout. Consequently, models for resident salmonids may be useful surrogates for anadromous species during their freshwater spawning and rearing stages. We used results of the predictive models for these resident salmonids as additional information to consider the alternatives with regard to the status of steelhead.

Alternative 1—Management under Alternative 1 will likely contribute to continued declines in steelhead across their range. Although individual Forest plans may provide some levels of site-specific restoration and protection for important local steelhead stocks, this alternative lacks a consistent conservation and restoration approach. Steelhead populations within designated wilderness areas in central Idaho (UCRB area) should not be adversely affected by this alternative. Populations outside of wilderness areas, however, would likely be exposed to increased timber harvest and thinning activities (table 3.20) and road construction. The number of subwatersheds with

moderate and high numbers of roads is expected to increase and subwatersheds with no roads are expected to decrease (table 3.11). Results of the classification tree analysis for bull trout, redband trout, and westslope cutthroat trout suggest widespread declines in the frequency of both strong and depressed populations within the range of steelhead (table 3.4). Very little watershed restoration is planned under this alternative (table 3.20). Timber harvest and road construction would also increase within areas supporting what may be the last remaining genetically intact steelhead stocks in Forest Clusters 2 and 5. Within rangelands, Alternative 1 provides only modest improvements in livestock management and very little planned riparian restoration (table 3.20). Declines would likely be most pronounced in areas managed most intensively for timber and range commodity production.

Alternative 2—Important habitats currently supporting strong populations of steelhead are likely to be conserved under this alternative. Most populations would be provided increased protection through the maintenance of both the INFISH and PACFISH riparian strategies as well as relatively low levels of projected land-disturbing activities. In general, we anticipate that habitats for important remnant populations associated with Federal lands will be largely conserved in current conditions. Continued disruption of habitats may occur where land-disturbing activities are most concentrated in the commodity-emphasis areas of Forest Cluster 3 and are associated with portions of the northern and southern Cascades and the lower Snake and Salmon Rivers in the Columbia Plateau and Central Idaho Mountains. Reductions in some of the highest watershed road densities (table 3.11) and moderate levels of watershed restoration activity (table 3.20) should work to improve conditions for some of the depressed populations that may persist in degraded habitats outside of these areas. In general, we would not expect strong rebuilding of steelhead populations under this alternative. The projections of watersheds with low road densities (table 3.11) and the trends predicted by the classification models for bull trout and westslope cutthroat trout that tend to overlap distributions with steelhead, suggest little in the way of major habitat restoration that would lead to substantial rebuilding of depressed stocks in degraded environments.

Alternative 3—We anticipate mixed results for habitats supporting steelhead populations throughout the current distribution of this species under Alternative 3. The few strong populations remaining will benefit from the focus of ecosystem analysis and more restrictive riparian protection measures associated with PACFISH and INFISH. Those benefits may not translate widely in the remaining distribution. Moderate or high timber harvest and thinning activities are forecast for most of the range including both strong and depressed populations (table 3.20). An increase in watersheds with very low and low road densities and a reduction in watersheds with high or extreme road densities (table 3.11) indicate some mitigation of increased activity, but low or moderate levels of watershed restoration in spawning and rearing habitats and none in seasonal or corridor watersheds suggest that activities may be focused more heavily on road closures than on full restoration. Because so few strong steelhead populations remain, the application of ecosystem analysis (Category 1 or strong populations) may provide little benefit to many of the depressed populations. Steelhead habitats that overlap with the current strong distributions of bull trout and westslope cutthroat trout, or are found in the Section 7 watersheds (largely the Central Idaho Mountains and Northern Cascades) are likely to fair best under this alternative. We anticipate that the habitats supporting currently strong populations and perhaps an important portion of the depressed populations (primarily in Forest Categories 1 and 2) will be conserved or modestly strengthened under this alternative. The remaining part of the range is less likely to benefit under this alternative, and we would not anticipate a strong rebuilding of habitats that could support broadly increasing populations.

Alternative 4—We anticipate that this alternative will largely conserve the habitats for remaining strong populations of steelhead if watershed restoration and ecosystem analysis are effective at focusing and mitigating more intensive land management activities. Although combined timber harvest and thinning activities are anticipated to be moderate to high, positive changes in road densities (table 3.11) and some of the highest levels of watershed and riparian restoration across alternatives (table 3.20) could mitigate some of this risk. Additionally, the focus on ecosystem analysis in Category 1 watersheds and watersheds supporting strongholds for salmonids should allow activities to be focused with the least risk to critical habitats and perhaps with the benefit of extending and strengthening those distributions. Conservation or restoration of habitats across the distribution of depressed steelhead populations is less likely. Even though high levels of watershed and riparian restoration are predicted for much of the depressed distribution in watersheds that do not coincide with Category 1 or strongholds for other species, the lack of ecosystem analysis could mean that activities are focused ineffectively. The potential to benefit habitats through increased active restoration is important but we are uncertain whether it can be realized without detailed analysis and planning. The greatest benefits should be afforded to the strong populations found principally in the Blue Mountains and to depressed populations associated with Forest Cluster 1 in the Central Idaho Mountains. The greatest risks are likely associated with depressed populations in the Blue Mountains, Columbia Plateau, and Central Idaho Mountains associated with Forest Clusters 3, 4, and 5.

Alternative 5—Alternative 5 is not expected to conserve habitats supporting strong populations or prevent further declines in habitats for steelhead across much of the range. Although this alternative adequately conserves some remaining strongholds outside of commodity-emphasis areas, steelhead trout stocks that overlap commodity-emphasis areas in Forest Cluster 5 and Range Clusters 1 and 6 will be subject to land disturbance from timber harvest and livestock. Core areas outside of commodity-emphasis areas will be managed identically to Alternative 4. Within commodity-emphasis areas, standards provide little protection to riparian areas and minimal ecosystem analysis and there is no process to address cumulative watershed effects. High levels of harvest and thinning are not compensated by increased watershed restoration or road-density reductions (tables 3.11 and 3.20). Results of the predictive models suggest declines in the frequency of both strong and depressed populations of bull trout within the range of steelhead (table 3.8). Except for Alternatives 1 and 2, this alternative has the smallest reduction in high road densities (table 3.11).

Alternative 6—This alternative provides protection for the habitats supporting strong populations and much of the depressed distribution similar to that under Alternative 4. Because activity levels are lower and there is an emphasis on a more conservative and adaptive approach, we would anticipate similar benefits and perhaps fewer risks than under Alternative 4. Similar to Alternative 4, this alternative places special emphasis on subbasins that support strongholds or a Category 1 recognition. Because so few strongholds for steelhead remain, and because portions of the range may not overlap with other species or Category 1 watersheds, all remaining populations may not receive a conservation emphasis or the focus of ecosystem analysis. Timber harvest levels are generally low or moderate in most areas, so risks tend to be minimized and to some extent mitigated by positive changes in road densities, moderate levels of watershed restoration and high levels of riparian restoration (table 3.20). Some thinning in areas within Forest Clusters 2 and 6, supporting genetically intact populations, would occur. An emphasis on watershed restoration (table 3.20) and reduced road density (table 3.11) should particularly benefit Forest Clusters 2 and 5 that support all of the strong and most of the depressed populations. Results of the classification tree analysis for resident salmonids suggest a positive trend in the distribution of bull trout and westslope cutthroat trout in most subbasins within the range of steelhead (table 3.9).

Alternative 7—This alternative provides a system of reserves and very restricted management activities that should conserve much of the remaining distribution of steelhead. It may lead to some rebuilding of habitats in the reserve areas, but restoration of habitats in more degraded landscapes will be mixed, occurring more slowly in areas without active watershed restoration. This alternative identifies roadless reserves that will contain an important, but not dominant, part of the remaining, occupied steelhead habitats (table 3.11). With limited timber harvest and thinning activities (table 3.20), the combination of riparian habitat conservation requirements for ecosystem analysis and a cumulative effects process should conserve the current conditions of most habitats outside the reserves. The continued degradation of some watersheds with a legacy of past management, however, is unlikely to be mitigated with the limited watershed restoration activity. Results of the predictive models suggest positive trends in the frequency of both strong and depressed populations of bull trout and westslope cutthroat trout within the range of steelhead (table 3.10). Within rangelands, this alternative includes a major reduction (50%) in grazing, the largest increases in livestock management, and a moderate increase in active riparian restoration (table 3.20). These factors should benefit steelhead stocks in currently degraded rangeland habitats perhaps more strongly than those in degraded forest environments. Similar to the other alternatives, Alternative 7 does not identify depressed populations outside of strongholds for any special emphasis. Unlike the other alternatives, it is much more comprehensive in addressing the influence of other factors such as mining, transport and storage of toxic materials, and water transfers.

Summary—Steelhead have been extirpated from the majority of their historical range. Most remaining steelhead populations are depressed and the long-term persistence of remaining populations is highly uncertain. Because of high mortalities associated with dams and other factors in the ocean and migratory corridors, freshwater habitats may make the important difference between populations that persist and those that go extinct. Conservation or restoration of currently occupied habitats may be critical to the persistence of the remnant populations. All of the alternatives except Alternatives 1 and 5 are anticipated to conserve the habitats currently supporting strong populations (table 3.26). Although each of the alternatives will confer some protection for habitats supporting depressed populations, the results under all of the alternatives are likely to be mixed and uncertain. Alternatives 2 and 3 provide extended protection to steelhead habitats associated with the implementation of the PACFISH and INFISH conservation strategies but provide relatively little emphasis on habitat restoration. Alternatives 1, 3, 4 and 5 support high levels of timber harvest and thinning activities that represent increased risks for some populations. Although an increased emphasis on watershed restoration activities under these alternatives could mitigate much of the risk and provide important restoration of current and potential future habitats, the lack of a clear emphasis on ecosystem analysis outside of the Category 1 or stronghold watersheds makes that result uncertain. Alternative 6 is similar to Alternative 4 in this regard but the lower levels of land-disturbing activity, and the more conservative and adaptive approach could benefit populations across the range. Continuing declines are most likely under Alternatives 1 and 5 particularly in the commodity-emphasis areas outside Forest Clusters 1 and 2. Alternative 7 with the implementation of conservation reserves, reduced land-disturbing activities, and a restrictive riparian management strategy will likely conserve much of the remaining habitat. Some degraded habitats, however, may be restored more slowly or even decline further with limited emphasis on active restoration in Alternative 7. It is unlikely that any activities on Federal lands will result in strong rebuilding of steelhead populations without substantial improvements in other factors influencing these populations. If conditions outside spawning and rearing habitats remain poor, it is possible that many remaining stocks will continue to decline.

Table 3.26. Projected effects of the seven proposed alternatives on steelhead trout and stream-type chinook salmon.

Will the Alternative:	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
1. Conserve strong populations in the central or core portions of the species' range?	No	Yes	Uncertain	Yes	No	Yes	Yes
2. Prevent declines in habitats or populations throughout the entire species' range?	No	No	No	Uncertain	No	Yes	Uncertain
— if "no", where are declines most likely to occur (on FS/BLM lands)?	Outside of wilderness and other protected areas	Forest Cluster 3	Category 2 and 3 subbasins, Forest Cluster 5	Category 2 and 3 subbasins, Forest Clusters 3, 4, and 5	Category 2 and 3 subbasins, commodity-emphasis areas		Outside reserves in currently degraded watersheds
3. Help rebuild depressed populations by restoring habitats?	No	Yes	Yes	Yes	Yes	Yes	Yes
— if "yes", where?		*PACFISH*[1] priority watersheds	Category 1 subbasins, Forest Clusters 1 and 2			Mixed results across species' range	
What is the role of factors other than habitat?	The combined effects of hydropower operations, hatcheries, and harvest may limit increases in wild populations in areas where freshwater spawning and rearing habitats are restored. Similarly, protection of high-quality freshwater habitats will not guarantee population persistence without mitigation of other factors.						

[1](PACFISH) U.S. Department of Agriculture, Forest Service and U.S. Department of Interior, Bureau of Land Management. 1994. Draft environmental assessment. Interim strategies for managing anadromous fish-producing watersheds on Federal lands in eastern Oregon and Washington, Idaho, and portions of California. Washington DC: U.S. Department of Agriculture, Forest Service; U.S. Department of Interior Bureau of Land Management. [irregular pagination].

Stream-type chinook salmon
(Oncorhynchus tshawytscha)

Stream-type chinook salmon formerly occupied approximately 45 percent of the subwatersheds in the Basin and were found within both the UCRB and EEIS planning areas. Stream-type chinook salmon are extirpated in about 72 percent of the historical range, primarily as a result of blocked access to historical habitats. Remaining chinook salmon stocks are extremely depressed. Few healthy populations persist in the current range; less than 1 percent of the subwatersheds support strong populations. Wild fish, unaltered by hatchery introgression, are likely found in only 4 percent of the historical range. Snake River stocks of stream-type chinook salmon are currently listed as a threatened species under the Federal ESA. We evaluated these alternatives on their own merits, regardless of future requirements for consultation under the ESA. Additional requirements through Section 7 of the ESA would be expected to provide added protection for critical habitats. Management of FS- and BLM-administered lands affects 88 percent of subwatersheds with strong populations of stream-type chinook, and 72 percent of subwatersheds with depressed populations (table 3.17). Approximately 38 percent of the strong and 23 percent of the depressed populations occur in wilderness areas. Because so few strong populations persist, virtually all subwatersheds that sustain wild and naturally-reproducing stream-type chinook salmon should be considered critical habitats. Chinook salmon are dependent on habitats in both forestland and rangeland areas; activities in either category will affect populations.

Because of their anadromous life history, stream-type chinook salmon are affected by Federal land management in migration corridors and spawning and rearing areas, and by other factors that operate outside of Federal lands in freshwater, estuaries, and the ocean environment. Approximately 64 percent of the migration corridors between freshwater spawning and rearing habitats and the ocean lie on private or tribal lands. Restoration of habitats and habitat connectivity in both mainstem rivers and subbasins may be important for stream-type chinook salmon stocks to persist (Lee and others, in press). Recent declines in stream-type chinook salmon stocks can be attributed primarily to the construction and operation of mainstem dams on the Columbia and Snake Rivers (CBFWA 1990, Raymond 1988). Due to passage mortalities associated with the dams (IDFG and others 1990; Raymond 1979, 1988), only the most productive populations may retain the resilience to persist in the face of natural and human-caused disturbance. Any changes in the environment that influence survival and productivity of remaining stream-type chinook salmon stocks, including improvements in spawning and rearing habitats and reduced mortality from fishing, predation, and mainstem passage, will improve chances for persistence in stochastic environments (Emlen 1995). Simply put, under current conditions in migrant survival, many stocks are at serious risk. The differences between chinook populations that persist and those that are extirpated may depend on their survival and productivity in freshwater spawning and rearing habitats. Without substantial improvement in migrant survival, conserving and restoring the quality of freshwater habitats may make an important difference in persistence for many populations. In the longer term, assuming mainstem conditions are resolved, it will be necessary to conserve and restore broader habitat networks to support the full expression of life histories and species (Lee and others, in press; Lichatowich and Mobrand 1995).

To ensure population persistence and rebuilding, conservation and restoration of Federal-land habitat must work in concert with other factors affecting stream-type chinook salmon. Although conservation and restoration of freshwater habitats may be critical to stock persistence, such efforts are unlikely to improve the distribution and abundance of stream-type chinook salmon without substantial improvements in survival outside of spawning and rearing areas.

As described previously for steelhead trout, classification trees for predicting the likelihood of changes in the distribution of strong populations of chinook salmon were not sensitive to changes in road density as they were for resident salmonids. Similar to steelhead, models for resident salmonids may be useful surrogates for stream-type chinook salmon during their freshwater spawning and rearing stages. We used results of the classification trees for redband trout, bull trout, and westslope cutthroat trout to provide additional information when considering the effects of each alternative on stream-type chinook salmon. Results of the alternative evaluation for chinook are similar to those for steelhead. Stream-type chinook salmon tend to occupy larger streams and are more depressed than are most steelhead stocks.

Alternative 1—Alternative 1 will likely contribute to continued declines in stream-type chinook salmon within spawning and rearing areas and migration corridors across their range. Although individual Forest plans may provide some levels of site-specific restoration and protection for local stocks, this alternative lacks a consistent conservation and restoration approach. Stream-type chinook salmon populations within designated wilderness in central Idaho (UCRB area) should not be adversely affected by this alternative. Populations outside of wilderness, however, will be affected by increased timber harvest and thinning activities and increased road construction (table 3.20). The number of subwatersheds with moderate and high numbers of roads is expected to increase (table 3.11). Very little watershed restoration is planned under this alternative (table 3.20). Timber harvest and road construction will also increase within areas supporting what may be the last remaining genetically intact stocks in Forest Clusters 2 and 5. Within rangelands, Alternative 1 has only modest improvements in livestock management and very little planned riparian restoration (table 3.20). Declines will likely be most pronounced in areas managed most intensively for timber and range commodity production.

Alternative 2—Alternative 2 will likely protect the few remaining strong populations of stream-type chinook salmon, but is unlikely to prevent declines in other portions of the species's range or to help rebuild depressed populations in areas with degraded habitat outside of PACFISH priority watersheds. Although increased protection of watersheds may be provided, land-disturbing activities will continue throughout much of the range and there is little emphasis on restoration of degraded areas. Increased protection is included under the application of PACFISH guidelines that would require watershed analysis if standards were to be altered. Land-disturbing activities including harvest and thinning are relatively low (table 3.20). Low levels of timber harvest and moderate thinning activities would occur in Forest Cluster 5, which supports all of the remaining strong stream-type chinook salmon populations and offsets some by moderate levels of road reduction (reducing high and extremely high road densities). Basin-wide, there is essentially no expected change in the number of unroaded to low road-density subwatersheds (table 3.11). Alternative 2 identifies riparian areas and landslide-prone areas, but populations or habitats that may require special emphasis are not identified. There is also a lack of emphasis on restoration of depressed habitats. In rangelands, there is little emphasis on riparian restoration and increases in livestock management would occur (table 3.20). Consequently, currently degraded habitats may not receive the restoration effort needed to reverse population declines.

Alternative 3—We are uncertain whether Alternative 3 will conserve remaining strong populations, and do not expect it to prevent further declines in populations of stream-type chinook salmon. Limited restoration of degraded habitats in some areas is expected. Since Forest Cluster 5 supports all of the remaining strong populations (table 3.19) and many of the wild populations without hatchery influence, activities within this cluster are particularly important. Moderate levels of timber harvest and high levels of thinning are planned for Forest Cluster 5 under this alternative.

These activities are offset some by moderate levels of road reduction, but only a low level of watershed restoration is planned. While increased watershed protection is provided under the application of PACFISH guidelines and ecosystem analysis in subwatersheds with strong populations, it is uncertain whether there will be sufficient emphasis on restoring and protecting habitats across entire subbasins within Forest Cluster 5 to prevent further declines of population strongholds. We are concerned that subwatersheds which currently support strong populations may become more isolated and fragmented by activities occurring upstream and in adjacent subwatersheds that are not provided the same level of protection. Because chinook tend to spawn in larger streams, spawning conditions may be influenced by the cumulative effect of activities in multiple watersheds. In Forest Clusters 1 and 2, which represent much of the best remaining habitats for stream-type chinook, low levels of harvest and moderate levels of watershed restoration should help to protect high-quality habitats and restore degraded conditions on Federal lands within central Idaho and the northern Cascades.

Alternative 4—Alternative 4 can conserve strong populations, prevent further declines in habitats and populations, and help rebuild depressed populations in degraded areas—but only if watershed restoration is effective in improving habitat conditions. Although this alternative emphasizes active management to restore degraded areas, there are risks associated with land-disturbing activities. Levels of timber harvest and thinning are higher than in most other alternatives (table 3.20). There are moderate timber harvest and thinning activities in Forest Clusters 3 and 5, which are offset by moderate levels of watershed restoration and moderate and high levels of road reduction. This alternative has a system of RMAs with stronger requirements for ecosystem analysis and slope-adjusted RMA widths. Increased emphasis on watershed restoration and reduced road densities (table 3.11) potentially could improve habitat conditions throughout most of the species' range. Restoration activities could negatively affect habitats and negate the benefits, however, if not closely monitored to ensure effectiveness. Benefits seem most assured in Forest Clusters 1 and 2, which have lower levels of harvest and thinning activities. In rangelands, Alternative 4 has a moderate increase in livestock management and a large increase in riparian restoration (table 3.20).

Alternative 5—Alternative 5 is not expected to conserve strong populations or prevent further declines in habitats or populations of stream-type chinook salmon stocks. Although this alternative adequately protects populations outside of commodity-emphasis areas, stream-type chinook salmon overlap commodity-emphasis areas in Forest Cluster 5 and Range Clusters 1 and 6 and will be subject to moderate to high land disturbance from timber harvest and livestock. Areas outside of commodity-emphasis areas, such as Forest Clusters 1 and 2, will be managed similarly to Alternative 4 and will see similar benefits. Within commodity-emphasis areas, standards provide little protection of riparian areas and minimal ecosystem analysis and there is no process to address cumulative watershed effects. High levels of harvest and thinning are not compensated by increased watershed restoration or road-density reductions (table 3.20). Except for Alternatives 1 and 2, this alternative has the smallest reduction in high road densities (table 3.11).

Alternative 6—Alternative 6 protects strong populations and applies a conservative and adaptive approach to restoration that should benefit stream-type chinook salmon stocks throughout their range. Similar to Alternative 4, this alternative places special emphasis on Category 1 subbasins and subwatersheds that support strong populations. Because so few strongholds for stream-type chinook salmon remain, however, many core areas that support depressed populations do not receive a conservation emphasis. Timber harvest levels are low in most areas so risks are minimized (table 3.20). Under Alternative 6 there would be some thinning in areas within Forest Clusters 2 and 6 that support genetically intact populations. This alternative has a system of RMAs with

stronger requirements for ecosystem analysis, and requirements are adjusted based on slope. Moderate levels of watershed restoration and extensive reductions in road densities (table 3.11) should benefit stream-type chinook throughout their range. In rangelands, Alternative 6 has increased livestock management and a large increase in riparian restoration (table 3.20).

Alternative 7—Alternative 7 provides a system of reserves to conserve core areas and restrictive RMAs that should protect strong populations, but depressed populations in currently degraded habitats outside of reserves may continue to decline. Although restoration activities are low, land-disturbing activities are also minimal. Alternative 7 identifies special-emphasis areas as 1,000-acre (405 ha) roadless reserves that will contain the best remaining habitats and strongest populations. This approach will overlook some core populations in degraded habitats. Despite this problem, the combination of RHCAs, requirements for ecosystem analysis, and a cumulative effects process should conserve most core areas. This alternative has the lowest level of timber harvest and thinning (table 3.20). However, some thinning would occur within areas of high genetic integrity in Forest Cluster 5. Although restoration is not emphasized, reduced human disturbance coupled with reductions in road densities (table 3.11) should benefit depressed populations. Within rangelands, this alternative includes a 50 percent reduction in AUMs, the largest increases in livestock management, and a moderate increase in active riparian restoration (table 3.20). These factors should benefit stream-type chinook salmon stocks in currently degraded rangeland habitats. Similar to other alternatives, it does not identify at-risk populations outside of strongholds. Unlike the other alternatives, it is much more comprehensive in addressing the influence of other factors such as mining, transport and storage of toxic materials, and water transfers.

Summary—Most remaining stream-type chinook salmon populations are depressed and strong populations are rare. In the absence of strong populations, subwatersheds that retain high genetic integrity and those supporting naturally reproducing populations should be considered critical habitats. As with steelhead trout, until passage mortalities associated with the hydroelectric system in the mainstem migration corridors and other factors outside Federal lands are resolved, the resilience and persistence of stream-type chinook salmon stocks will be largely dependent on the quality of freshwater habitats (Lee and others, in press). High-quality spawning and rearing habitats can increase the likelihood that stocks will persist in stochastic environments (Emlen 1995). As a result, aggressive and extensive protection and restoration of spawning and rearing habitat will be needed to retain stock resilience. Alternative 1 will likely contribute to continued declines in stream-type chinook salmon within spawning and rearing areas and migration corridors across their range (table 3.26). Alternative 2 will likely protect the few remaining strong populations, but is unlikely to prevent declines in other portions of the species' range or to help rebuild depressed populations in areas with degraded habitat. We are uncertain whether Alternative 3 will conserve remaining strong populations, and do not expect it to prevent further declines. Alternative 4 can conserve strong populations, prevent further declines in habitats and populations, and help rebuild depressed populations in degraded areas—but only if watershed restoration is effective in improving habitat conditions. Alternative 5 is not expected to conserve remaining strong populations or prevent further declines in populations, though they may help rebuild some depressed populations. Alternative 6 is similar to Alternative 4, but applies a more conservative and adaptive approach to restoration that should benefit stream-type chinook salmon stocks throughout their range. Alternative 7 provides a system of reserves to conserve core areas and restrictive RMAs that should protect strong populations, but depressed populations in currently degraded habitats outside of reserves may continue to decline. With the exception of Alternative 7, none of the alternatives address effects other than timber and livestock-based activities. Moreover, none of the alternatives address the needs and

opportunities for restoring habitat conditions outside Federal lands, nor do they address the need for a comprehensive approach to restoring stream-type chinook salmon habitat and alleviating causes of mortality in freshwater spawning and rearing areas, migration corridors, estuaries, and the ocean. Without a comprehensive approach, even those alternatives that most benefit stream-type chinook salmon could not be expected to ensure persistence.

Ocean-type chinook *(Oncorhynchus tshawytscha)*

Ocean-type chinook salmon formerly occupied about 7 percent of the subwatersheds in the Basin and were found primarily in mainstem reaches of the Snake and Columbia Rivers within the UCRB and EEIS planning areas. The species occurred in six ERUs and was present in the fewest subwatersheds of any of the seven key salmonids. Ocean-type chinook salmon are extinct in approximately 70 percent of the historical range, primarily as a result of blocked access to historical habitats. Remaining ocean-type chinook salmon stocks are depressed and at risk. Few healthy populations persist in the current range; 15 percent of the subwatersheds support strong populations and all of these are within the lower mainstem and mid-Columbia Rivers. Wild fish, unaltered by hatchery stocks, are rare and present in 5 percent of the historical range. Ocean-type chinook salmon stocks in the UCRB area are severely depressed and stocks in the Snake River are listed as a threatened species under the Endangered Species Act. As with steelhead and stream-type chinook salmon, we evaluated the alternatives on their own merits, regardless of future requirements for consultation under the ESA. Additional requirements under Section 7 of the Endangered Species Act would be expected to provide added protection of critical habitats. Management of FS- and BLM-administered lands will have a relatively minor influence on ocean-type chinook salmon populations; 14 percent of strong populations and 22 percent of depressed populations are on federally administered land (table 3.18). Approximately 10 percent of the depressed populations are in wilderness areas.

The effects of Federal land management on ocean-type chinook salmon are less direct than on steelhead trout and stream-type chinook, because ocean-type chinook depend on lower-elevation, mainstem river habitats. The species is proportionally more affected by a large number of other factors that operate outside of Federal lands in freshwater, estuaries, and the ocean environment. All of the migration corridors between freshwater spawning and rearing habitats and the ocean lie on private or tribal lands. Restoration of habitats and habitat connectivity in mainstem rivers will be necessary for ocean-type chinook salmon stocks to persist. Recent declines in ocean-type chinook salmon stocks can be attributed primarily to the construction and operation of mainstem dams on the Columbia and Snake Rivers (CBFWA 1990). With some exceptions, the resilience and persistence of ocean-type chinook salmon stocks will be largely dependent on the quality and diversity of mainstem habitats outside of Federal lands. For ocean-type chinook salmon to persist, the combination of factors that influence stocks over space and time needs to be addressed simultaneously.

Within the UCRB area, wild and naturally spawning stocks of ocean-type chinook salmon will require aggressive and extensive protection and restoration of mainstem spawning and rearing habitat and migration corridors to improve the likelihood of persistence. Management of Federal lands does not unilaterally influence the quality of most mainstem habitats, primarily because mainstem areas are profoundly influenced by activities outside of Federal lands. Mainstem areas might benefit from land management activities that substantially reduce sediment and ensure an abundant supply of water with suitable chemical and physical characteristics during key life history stages. In many cases, however, waters from Federal lands are obstructed and altered by dams and impoundments in their lower elevations. Federal land management does influence mainstem river conditions where tributaries enter mainstems directly.

In contrast, ocean-type chinook salmon stocks in the lower and mid-Columbia River areas of the EEIS area are relatively strong, though much of their range has been lost due to hydroelectric development and many stocks are heavily influenced by hatcheries.

As a result of the considerations described above, none of the alternatives would be expected to meet the habitat needs of the ocean-type chinook salmon, manage perceived threats, nor ensure persistence of the populations. Alternatives 6 and 7 have the most conservative approach to conserving and restoring watersheds. These alternatives might result in some benefit to ocean-type chinook salmon if actions tend to improve water quality and quantity on Federal lands through reductions in road densities, reduced timber harvest, reduced grazing, and adequate protection of RHCAs and RMAs (tables 3.11 and 3.20). It is uncertain if these effects would be sufficient to improve population persistence, however. The remainder of the alternatives (that is, Alternatives 1-5) would likely not benefit ocean-type chinook salmon because these alternatives continue land-disturbing activities and do not emphasize restoration of degraded mainstem habitats. In summary, none of the alternatives can be expected to ensure the persistence of ocean-type chinook salmon, and two have uncertain benefits. To ensure persistence, a comprehensive approach is needed that addresses the myriad factors that affect the species, both on and off of Federal lands.

Step 3: Evaluation of Effects on Sensitive Species

General Assumptions and Information Base

We made three general assumptions in addition to those mentioned above:

1. Management strategies for sensitive fishes with restricted, narrowly endemic distributions are more appropriately described at a fine scale involving site-specific agreements and local land-use planning. Analyses of strategies at the broader scale, such as the ICBEMP preliminary draft EIS alternatives, are inappropriate for such species.
2. Nothing is designed or implied in the preliminary draft EIS alternatives that precludes or nullifies management agreements, recovery plans, biological opinions, or other documents that provide site-specific or species-specific strategies for sensitive, endemic taxa. In other words, whatever protections that are in place for sensitive species at local planning levels will remain in effect and applicable provisions contained in preliminary draft EIS alternatives will only add to existing measures, not substitute for them.
3. Species listed as threatened or endangered pursuant to the Endangered Species Act receive protection through Section 7 requirements, existing biological opinions, and critical habitat designations despite which preliminary draft EIS alternative is chosen.

To aid in our evaluation, we prepared summary tables, similar to those prepared for the key salmonids, that show levels of activity within the reported range of each species (table 3.27), mean values for selected variables across the historical and current range (table 3.28), and ownership and management designations (table 3.29). The effects of alternatives on 18 rare and sensitive fishes are summarized in table 3.30 by rating their ability to provide sufficient protection to halt further declines.

Pacific lamprey *(Lampetra tridentata)*

The distributional data for Pacific lamprey spawning and rearing areas are lacking in some regions. In general, our knowledge of this species precludes evaluation except that we believe juvenile steelhead approximate the distribution and habitat requirements of Pacific lamprey. We assume that the evaluation of alternatives for steelhead would serve as an appropriate proxy for Pacific lamprey.

Table 3.27. Forest and range management activities and distribution of select sensitive species. Estimates represent the percentage of the reported distribution predicted to experience the activity per decade. Estimates are based on the allocation of activities for alternatives in the preliminary draft EISs, and on the distributions of sensitive species as defined in Lee and others (1996).

		Forest Activity				Range Activity	
Species	Alt.	Harvest	Thinning	Watershed Restoration	Prescribed Burning	Livestock Management	Riparian Restoration
Pacific lamprey	1	6.6	3.0	1.2	2.0	6.4	1.2
	2	2.7	2.3	2.3	2.0	12.0	1.2
	3	4.8	4.0	2.3	4.0	11.7	18.2
	4	4.8	5.1	3.7	7.3	12.0	37.2
	5	4.8	4.6	3.2	5.5	10.5	20.6
	6	2.0	4.5	3.2	6.7	12.3	24.7
	7	1.6	2.3	1.2	3.3	15.7	10.2
Pit-Klamath brook lamprey	1	9.0	4.5	1.5	2.5	7.3	1.2
	2	2.3	4.3	1.7	2.5	14.0	1.2
	3	7.0	6.8	1.7	2.8	14.0	27.5
	4	7.0	7.0	4.0	9.8	14.0	38.0
	5	7.0	7.0	4.0	7.0	12.3	11.7
	6	2.5	6.8	4.0	9.8	14.0	11.7
	7	2.0	4.3	1.5	2.8	16.0	1.2
Lahontan cutthroat trout	1	0.0	0.0	0.0	0.0	3.0	1.2
	2	0.0	0.0	0.0	0.0	9.0	1.2
	3	0.0	0.0	0.0	0.0	3.0	38.0
	4	0.0	0.0	0.0	0.0	9.0	38.0
	5	0.0	0.0	0.0	0.0	9.0	38.0
	6	0.0	0.0	0.0	0.0	16.0	38.0
	7	0.0	0.0	0.0	0.0	16.0	1.2
Pygymy whitefish	1	6.6	3.3	1.5	2.5	8.1	0.8
	2	4.4	2.7	2.8	2.5	11.1	0.8
	3	5.2	4.8	2.8	4.8	11.1	16.8
	4	5.2	5.3	3.8	7.9	11.1	26.4
	5	6.8	5.1	2.8	3.9	11.1	0.8
	6	4.3	4.8	3.8	7.0	11.1	10.4
	7	2.0	1.5	1.5	5.6	11.1	0.8
Oregon Lakes tui chub	1	9.0	4.5	1.5	2.5	3.0	1.2
	2	2.0	4.5	1.5	2.5	9.0	1.2
	3	7.0	7.0	1.5	2.5	9.0	38.0
	4	7.0	7.0	4.0	10.0	9.0	38.0
	5	7.0	7.0	4.0	7.0	9.0	38.0
	6	2.5	7.0	4.0	10.0	9.0	38.0
	7	2.0	4.5	1.5	2.5	16.0	38.0
Leatherside chub	1	0.9	0.2	0.2	0.4	3.9	1.2
	2	0.3	0.2	0.2	0.4	10.1	1.2
	3	0.4	1.1	0.2	0.4	7.8	38.0
	4	0.4	1.1	0.2	1.1	10.1	38.0
	5	1.1	0.7	0.2	1.1	10.1	32.3
	6	0.4	1.1	0.2	1.1	12.8	32.3
	7	0.3	0.2	0.2	1.1	16.0	18.2

Table 3.27 (continued)

		Forest Activity				Range Activity	
Species	Alt.	Harvest	Thinning	Watershed Restoration	Prescribed Burning	Livestock Management	Riparian Restoration
Lost River sucker	1	9.0	4.5	1.5	2.5	8.3	1.2
	2	4.0	3.0	2.8	2.5	15.1	1.2
	3	7.0	5.8	2.8	4.8	15.1	33.4
	4	7.0	7.0	4.0	8.5	15.1	38.0
	5	7.0	7.0	4.0	7.0	14.4	5.8
	6	2.5	5.8	4.0	8.5	15.1	5.8
	7	2.0	3.0	1.5	4.8	16.0	1.2
Warner sucker	1	0.0	0.0	0.0	0.0	3.0	1.2
	2	0.0	0.0	0.0	0.0	9.0	1.2
	3	0.0	0.0	0.0	0.0	9.0	38.0
	4	0.0	0.0	0.0	0.0	9.0	38.0
	5	0.0	0.0	0.0	0.0	9.0	38.0
	6	0.0	0.0	0.0	0.0	9.0	38.0
	7	0.0	0.0	0.0	0.0	16.0	38.0
Goose Lake sucker	1	9.0	4.5	1.5	2.5	3.0	1.2
	2	2.0	4.5	1.5	2.5	9.0	1.2
	3	7.0	7.0	1.5	2.5	9.0	1.2
	4	7.0	7.0	4.0	10.0	9.0	38.0
	5	7.0	7.0	4.0	7.0	3.0	38.0
	6	2.5	7.0	4.0	10.0	9.0	38.0
	7	2.0	4.5	1.5	2.5	16.0	1.2
Shortnose sucker	1	9.0	4.5	1.5	2.5	8.1	1.2
	2	3.0	3.8	2.1	2.5	15.0	1.2
	3	7.0	6.4	2.1	3.6	15.0	32.5
	4	7.0	7.0	4.0	9.3	15.0	38.0
	5	7.0	7.0	4.0	7.0	14.1	6.7
	6	2.5	6.4	4.0	9.3	15.0	6.7
	7	2.0	3.8	1.5	3.6	16.0	1.2
Klamath largescale sucker	1	9.0	4.5	1.5	2.5	6.6	1.2
	2	2.6	4.0	1.9	2.5	13.2	1.2
	3	7.0	6.6	1.9	3.2	13.2	23.1
	4	7.0	7.0	4.0	9.5	13.2	38.0
	5	7.0	7.0	4.0	7.0	10.7	16.2
	6	2.5	6.6	4.0	9.5	13.2	16.2
	7	2.0	4.0	1.5	3.2	16.0	1.2
Wood River bridgelip sucker	1	2.4	0.6	0.6	1.0	3.0	1.2
	2	0.8	0.6	0.6	1.0	9.0	1.2
	3	1.0	2.8	0.6	1.0	9.0	38.0
	4	1.0	2.8	0.6	2.8	9.0	38.0
	5	2.8	1.8	0.6	2.8	9.0	38.0
	6	1.0	2.8	0.6	2.8	9.0	38.0
	7	0.8	0.6	0.6	2.8	16.0	38.0

Table 3.27 (continued)

		Forest Activity				Range Activity	
Species	Alt.	Harvest	Thinning	Watershed Restoration	Prescribed Burning	Livestock Management	Riparian Restoration
Torrent sculpin	1	7.3	3.6	1.2	2.1	3.4	0.8
	2	4.1	3.2	1.6	2.1	7.5	0.8
	3	5.7	5.4	1.6	2.7	7.0	15.5
	4	5.7	5.8	3.2	6.3	7.5	24.1
	5	7.2	5.7	2.0	3.6	7.0	14.7
	6	4.2	5.4	3.2	6.3	8.0	14.7
	7	1.6	1.8	1.2	5.0	10.1	8.9
Shorthead sculpin	1	6.3	3.1	1.4	2.3	3.9	0.8
	2	3.2	2.9	2.2	2.3	7.8	0.8
	3	4.8	4.7	2.2	3.7	6.8	20.2
	4	4.8	5.0	3.6	7.8	7.8	24.3
	5	6.0	4.7	2.7	4.1	7.3	13.5
	6	3.6	4.9	3.4	7.0	9.0	14.6
	7	1.8	2.0	1.4	4.1	10.2	4.3
Slender sculpin	1	9.0	4.5	1.5	2.5	9.0	1.2
	2	3.3	3.5	2.3	2.5	16.0	1.2
	3	7.0	6.2	2.3	4.0	16.0	38.0
	4	7.0	7.0	4.0	9.0	16.0	38.0
	5	7.0	7.0	4.0	7.0	16.0	1.2
	6	2.5	6.2	4.0	9.0	16.0	1.2
	7	2.0	3.5	1.5	4.0	16.0	1.2
Margined sculpin	1	3.5	1.8	0.6	1.0	3.0	1.2
	2	0.8	1.8	0.6	1.0	9.0	1.2
	3	2.7	2.7	0.6	1.0	9.0	1.2
	4	2.7	2.7	1.6	3.9	9.0	38.0
	5	2.7	2.7	1.6	2.7	9.0	38.0
	6	1.0	2.7	1.6	3.9	9.0	38.0
	7	0.8	1.8	0.6	1.0	16.0	38.0
Wood River sculpin	1	3.4	0.8	0.8	1.4	3.0	1.2
	2	1.1	0.8	0.8	1.4	9.0	1.2
	3	1.4	3.9	0.8	1.4	9.0	38.0
	4	1.4	3.9	0.8	3.9	9.0	38.0
	5	3.9	2.5	0.8	3.9	9.0	38.0
	6	1.4	3.9	0.8	3.9	9.0	38.0
	7	1.1	0.8	0.8	3.9	16.0	38.0
Malheur sculpin	1	2.7	1.4	0.5	0.8	3.0	1.2
	2	0.6	1.4	0.5	0.8	9.0	1.2
	3	2.1	2.1	0.5	0.8	9.0	38.0
	4	2.1	2.1	1.2	3.0	9.0	38.0
	5	2.1	2.1	1.2	2.1	9.0	38.0
	6	0.8	2.1	1.2	3.0	9.0	38.0
	7	0.6	1.4	0.5	0.8	16.0	38.0

Table 3.28. Means for landscape variables associated with the historical range of 17 select sensitive species. The species' distributions and the summary of landscape variables are as defined in Lee and others (1996).

		Number of	Variables								
Species	Range	watersheds	anadac[1]	dampass[2]	drnden[3]	elev[4]	mtemp[5]	pprecip[6]	rdmean0[7]	slope[8]	hucorder[9]
Goose Lake sucker	historical	11	0	0	1.15	5400	6.59	531	2.4	12.1	4.1
	current absent	4	0	0	0.98	5240	6.74	519	1.7	10.9	8.4
	current present	7	0	0	1.22	5476	6.53	536	2.8	12.6	2.1
Klamath largescale sucker	historical	39	0	0	0.61	4912	6.41	565	2.9	9.0	19.1
	current absent	7	0	0	0.78	5184	5.83	520	3.2	8.6	7.3
	current present	32	0	0	0.57	4846	6.55	577	2.9	9.0	22.0
Warner sucker	historical	20	0	0	1.09	5321	6.84	431	1.3	8.9	7.4
	current absent	12	0	0	1.11	5371	6.64	446	1.3	8.1	2.6
	current present	8	0	0	1.07	5259	7.07	411	1.2	10.0	13.4
Short nose sucker	historical	26	0	0	0.58	4837	6.61	538	2.8	9.3	25.5
	current absent	7	0	0	0.26	4535	7.75	394	2.6	8.8	24.9
	current present	19	0	0	0.64	4885	6.43	561	2.9	9.3	25.6
Lost River sucker	historical	13	0	0	0.48	4674	7.08	488	2.5	9.8	27.1
	current absent	6	0	0	0.44	4718	7.53	419	2.6	8.1	15.9
	current present	7	0	0	0.51	4641	6.73	542	2.4	11.0	35.7
Malheuer sucker	historical	43	0	0	1.09	4924	6.52	386	1.8	8.2	12.1
	current absent	10	0	0	1.01	5006	7.05	418	1.4	9.0	14.9
	current present	33	0	0	1.13	4885	6.27	370	2.0	7.8	10.7
Shorthead sculpin	historical	784	0.49	3.11	1.23	4718	5.24	753	1.5	20.1	49.6
	current absent	712	0.53	3.35	1.24	4697	5.30	744	1.4	20.1	53.2
	current present	72	0.15	0.77	1.18	4915	4.73	840	1.9	20.6	15.1
Wood River sculpin	historical	34	0	0	1.27	5724	4.58	441	1.2	15.3	12.9
	current absent	9	0	0	1.14	4725	5.64	348	1.7	7.4	18.4
	current present	25	0	0	1.32	6183	4.24	484	1.0	18.9	10.3
Margined sculpin	historical	37	0.81	4.25	1.28	2178	9.22	536	1.2	13.1	80.8
	current absent	19	0.82	3.93	1.27	1891	9.75	487	1.0	12.5	158.4
	current present	18	0.81	4.55	1.29	2441	8.74	580	1.4	13.6	9.7
Torrent sculpin	historical	459	0.53	3.29	1.17	3890	6.34	680	1.7	17.8	258.3
	current absent	369	0.57	3.68	1.19	3947	6.31	673	1.6	17.8	259.5
	current present	90	0.38	1.95	1.11	3689	6.43	703	2.0	17.7	253.9

Table 3.28 (continued)

Species	Range	Number of watersheds	Variables: anadac[1]	dampass[2]	drnden[3]	elev[4]	mtemp[5]	pprecip[6]	rdmean0[7]	slope[8]	hucorder[9]
Slender sculpin	historical	13	0	0	0.63	4830	6.33	542	2.9	9.8	30.9
	current absent	5	0	0	0.65	4729	6.66	282	3.4	9.7	15.1
	current present	8	0	0	0.62	4873	6.20	650	2.7	9.8	37.5
Oregon Lakes tui chub	historical	3	0	0	0.96	4835	7.41	389	1.2	10.3	14.7
	current absent	0	—	—	—	—	—	—	—	—	—
	current present	3	0	0	0.96	4835	7.41	389	1.2	10.3	14.7
Leatherside chub	historical	115	0	0	1.25	6026	5.02	512	0.9	13.4	53.6
	current absent	102	0	0	1.25	6124	4.93	529	0.9	13.8	58.3
	current present	13	0	0	1.21	5285	5.95	389	1.3	10.8	17.5
Pit-Klamath brook lamprey	historical	14	0	0	0.93	5146	6.01	618	3.1	9.3	15.8
	current absent	0	—	—	—	—	—	—	—	—	—
	current present	14	0	0	0.93	5146	6.01	618	3.1	9.3	15.8
Pacific lamprey	historical	1317	0.53	3.27	1.23	4295	6.46	588	1.4	17.1	156.9
	current absent	1132	0.46	2.99	1.25	4440	6.35	593	1.4	16.7	91.2
	current present	185	0.91	4.78	1.13	3511	7.06	562	1.5	19.2	512.3
Lahontan cutthroat trout	historical	8	0	0	1.23	5286	7.82	305	0.6	11.2	5.3
	current absent	6	0	0	1.18	5153	7.90	300	0.7	10.7	6.1
	current present	2	0	0	1.44	5853	7.47	326	0.3	13.1	2.2
Pygmy whitefish	historical	34	0	0	0.96	3558	5.57	809	1.7	19.2	321.0
	current absent	11	0	0	0.86	2772	6.81	542	1.7	18.2	714.4
	current present	23	0	0	1.02	3953	4.94	943	1.8	19.8	123.4

[1]anadac – access for anadromous fish (0 = no; 1 = yes).

[2]dampass – number of intervening dams.

[3]drnden – drainage density (mi/mi^2).

[4]elev – mean elevation (ft).

[5]mtemp – mean annual temperature.

[6]pprecip – mean annual precipitation.

[7]rdmean0 – mean road density.

[8]slope – area weighted average midslope.

[9]hucoder – number of upstream 6th-code hydrologic units.

Table 3.29. Summary of current reported distributions of 17 select sensitive species versus ownership and land management designation for each watershed. The data represent a summary of the assemblage database by management cluster as defined in Lee and others (1996).

		Number of	Management Clusters[1]									
Species	Range	watersheds	BR	FG	FH	FM	FW	NP	PA	PF	PR	TL
Goose Lake sucker	historical	11	0	0	0.320	0	0	0	0.140	0.520	0.027	0
	current absent	4	0	0	0.310	0	0	0	0.430	0.250	0.000	0
	current present	7	0	0	0.320	0	0	0	0.000	0.640	0.040	0
Klamath largescale sucker	historical	39	0.027	0.006	0.300	0.037	0.016	0	0.052	0.54	0.019	0
	current absent	7	0	0	0.440	0	0	0	0.036	0.52	0	0
	current present	32	0.033	0.008	0.270	0.046	0.020	0	0.056	0.54	0.024	0
Warner sucker	historical	20	0.690	0	0.056	0	0	0	0	0.019	0.210	0
	current absent	12	0.800	0	0.100	0	0	0	0	0.035	0.063	0
	current present	8	0.550	0	0	0	0	0	0	0	0.400	0
Shortnose sculpin	historical	26	0.039	0.009	0.180	0.047	0.023	0	0.076	0.600	0.028	0
	current absent	7	0	0	0	0.025	0	0	0.250	0.670	0.050	0
	current present	19	0.045	0.011	0.210	0.051	0.027	0	0.048	0.580	0.025	0
Lost River sculpin	historical	13	0.071	0	0.085	0.011	0.042	0	0.088	0.650	0.052	0
	current absent	6	0.160	0	0.160	0	0	0	0.120	0.440	0.120	0
	current present	7	0	0	0.026	0.020	0.075	0	0.064	0.810	0	0
Malheur sculpin	historical	43	0.500	0	0.240	0	0	0	0.019	0.031	0.220	0
	current absent	10	0.570	0	0.046	0	0	0	0.044	0	0.340	0
	current present	33	0.460	0	0.330	0	0	0	0.007	0.045	0.160	0
Shorthead sculpin	historical	784	0.083	0.077	0.090	0.170	0.140	0.014	0.130	0.18	0.083	0.041
	current absent	712	0.083	0.071	0.085	0.170	0.140	0.011	0.130	0.18	0.086	0.041
	current present	72	0.085	0.13	0.140	0.190	0.110	0.047	0.051	0.13	0.054	0.044
Wood River sculpin	historical	34	0.300	0.190	0.031	0	0	0	0.088	0	0.290	0
	current absent	9	0.230	0	0	0	0	0	0.21	0	0.260	0
	current present	25	0.340	0.280	0.045	0	0	0	0.032	0	0.310	0
Margined sculpin	historical	37	0	0.036	0.036	0.013	0	0	0.730	0.080	0.110	0
	current absent	19	0	0.033	0	0	0	0	0.760	0.080	0.120	0
	current present	18	0	0.039	0.068	0.026	0	0	0.690	0.080	0.093	0
Torrent sculpin	historical	459	0.041	0.033	0.076	0.150	0.100	0	0.240	0.220	0.089	0.043
	current absent	369	0.025	0.033	0.069	0.130	0.120	0	0.270	0.220	0.088	0.051
	current present	90	0.098	0.034	0.100	0.260	0.026	0	0.160	0.220	0.091	0.015

Table 3.29 (continued)

Species	Range	Number of watersheds	Management Clusters[1]									
			BR	FG	FH	FM	FW	NP	PA	PF	PR	TL
Slender sculpin	historical	13	0	0	0.210	0.029	0.041	0	0.035	0.680	0	0
	current absent	5	0	0	0.170	0.043	0	0	0	0.790	0	0
	current present	8	0	0	0.230	0.023	0.058	0	0.050	0.640	0	0
Oregon Lakes tui chub	historical	3	0.650	0	0	0	0	0	0	0.089	0.26	0
	current absent	0	0	0	0	0	0	0	0	0	0	0
	current present	3	0.650	0	0	0	0	0	0	0.089	0.26	0
Leatherside chub	historical	115	0.440	0.085	0.056	0	0.065	0.086	0.072	0.041	0.099	0.023
	current absent	102	0.460	0.079	0.056	0	0.074	0.097	0.078	0.032	0.097	0.026
	current present	13	0.350	0.130	0.055	0	0	0	0.022	0.1	0.12	0
Pit-Klamath brook lamprey	historical	14	0	0	0.280	0.015	0.048	0	0.063	0.6	0	0
	current absent	0	0	0	0	0	0	0	0	0	0	0
	current present	14	0	0	0.280	0.015	0.048	0	0.063	0.6	0	0
Pacific lamprey	historical	1317	0.200	0.068	0.110	0.058	0.090	0	0.170	0.130	0.130	0.037
	current absent	1132	0.240	0.077	0.110	0.055	0.081	0	0.150	0.120	0.130	0.042
	current present	185	0.003	0.022	0.120	0.072	0.140	0	0.290	0.190	0.150	0.010
Lahontan cutthroat trout	historical	8	0.900	0	0	0	0	0	0	0	0.097	0
	current absent	6	0.880	0	0	0	0	0	0	0	0.120	0
	current present	2	1	0	0	0	0	0	0	0	0	0
Pygmy whitefish	historical	34	0	0.035	0.010	0.240	0.024	0.019	0.100	0.400	0	0.170
	current absent	11	0	0.100	0.029	0.038	0	0	0.240	0.330	0	0.260
	current present	23	0	0	0	0.340	0.037	0.029	0.036	0.430	0	0.120

[1]BR = BLM rangelands; FG = FS forest and rangeland, moderate impact, grazed; FH = FS forest, high impact, grazed; FM = FS forest, high-moderate impact, no grazing; FW = FS-managed wilderness; NP = NPS forestland; PA = Private agriculture; PF = Private land and FS forestland; PR = Private and BLM rangeland; TL = Tribal lands.

Table 3.30. Evaluation of effects of alternatives on rare and sensitive fishes. The table answers the question, "Will the alternative provide sufficient protection to prevent declines in habitats and populations of 18 rare and sensitive fish species?"

Species	Proxy for Analysis	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Pygmy whitefish	None	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shortnose sucker, Lost River sucker, Klamath largescale sucker, Slender sculpin[1]	None	No	Yes	Yes	Yes	No	Yes	Yes
Warner sucker, Redband trout[2]	None	No	No	U[3]	U[3]	No	U[3]	U[3]
Wood River sculpin, Wood River bridgelip sucker[4]	None	No	Yes	Yes	Yes	No	Yes	Yes
Malheur sculpin, Redband trout[5]	None	No	No	U[3]	U[3]	No	U[3]	U[3]
Pacific lamprey	Juvenile steelhead trout	No	No	No	U[3]	No	Yes	U3
Pit-Klamath brook lamprey	Goose Lake sucker, Redband trout[1]	No	U[3]	UV	U[3]	No	U[3]	U[3]
Goose Lake sucker	Redband trout	No	No	U[3]	U[3]	No	U[3]	U[3]
Torrent sculpin	Westslope cutthroat	No	No	No	No	No	U[3]	Yes
Shorthead sculpin	Bull trout	No	No	No	U[3]	No	U[3]	U[3]
Margined sculpin	Redband trout	No	No	U[3]	U[3]	No	U[3]	Yes
Lahontan cutthroat trout	Protected under the ESA, Section 7, regardless of the alternative.							
Oregon Lakes tui chub	Information on current distributions and status of these species was insufficient for analysis.							
Leatherside chub								

[1] Klamath Basin Rare and Sensitive Fishes.
[2] Occur in the Warner Basin.
[3] U = Uncertain.
[4] Wood River Sensitive Fishes.
[5] Occur in the Harney Basin.

Refer to "Findings by Species, Steelhead" section of this chapter for a discussion of how alternatives would affect Pacific lamprey. Within the assessment area, Pacific lamprey and steelhead are believed to spawn in many of the same streams and the young of both species utilize similar rearing streams and would respond similarly to management activities. Strongholds for steelhead also are believed to be important areas for lamprey. As both species are anadromous, both are affected by dams and hydroelectric operations. Both species are harvested, although lampreys are taken as ammocoetes for bait and by Native Americans for ceremonial purposes. The fringe population of Pacific lampreys noted in the Klamath Basin may represent Klamath lampreys *(Lampetra similis)* or a land-locked form of Pacific lamprey. Moyle and others (1995) noted substantial confusion regarding lamprey taxonomy and identification in the Klamath Basin.

Pit-Klamath brook lamprey *(Lampetra lethophaga)*

The Pit-Klamath brook lamprey is a non-parasitic lamprey native to the Upper Klamath Basin and

upper Pit River (such as the Goose Lake Basin). This non-anadromous species completes its life cycle in small streams and moderate-size rivers. Relatively little is known about its distribution and life history requirements, but we assume them to be similar to other native, stream-dwelling fishes within this area. Based on distribution, two proxies would be appropriate for this species: Klamath Basin sensitive fishes for that portion of the Pit-Klamath brook lamprey's range in the Klamath Basin, and the Goose Lake sucker and redband trout for that portion of the lamprey's range in the Goose Lake Basin. Refer to "General Assumptions and Information Base", "Klamath Basin rare and sensitive fishes", and "Goose Lake sucker and redband trout in the Goose Lake basin" sections for a discussion of how alternatives would affect the Pit-Klamath brook lamprey. It is uncertain whether any alternative would prevent declines in populations and habitats of this species; Alternatives 1 and 5 would not prevent declines.

Lahontan cutthroat trout *(Oncorhynchus clarki henshawi)*

Populations of Lahontan cutthroat trout within the assessment area comprise the northern fringe of the distribution of this subspecies. Populations in Willow and Whitehorse Creeks within the assessment area were long-considered to comprise a separate subspecies and should be accorded special emphasis because of their long isolation from other Lahontan cutthroat trout and their occurrence in the most northerly native habitats of the subspecies. Populations in Washington, and in Oregon's Mann Lake are introduced, are of uncertain genetic purity, and are not considered further for purposes of this analysis. The subspecies is listed as threatened pursuant to the ESA throughout its range. Populations within the assessment area have received special emphasis through ESA Section 7 consultation, particularly as pertaining to effects of livestock grazing, which comprises the principal threat in addition to non-native trout introductions. Because the preliminary draft EIS alternatives would provide little protection beyond that already stipulated in Section 7 biological opinions and recovery planning documents, and because Section 7 requirements would remain in place regardless of the alternative selected, we believe that the Lahontan cutthroat trout in the assessment area would not be adversely affected by the selection of a preliminary draft EIS alternative.

Pygmy whitefish *(Prosopium coulteri)*

Pygmy whitefish are widely distributed in deep lakes and coldwater streams in the northern, glaciated portions of the Columbia River Basin. They often occur in lakes, but may move to smaller tributary streams for spawning. Water quality and maintenance of instream flows in tributary streams are the primary factors needed to maintain the species. Unlike many of the sensitive fishes in our analysis, we believe that the lake habitats of pygmy whitefish are less likely to be negatively impacted by management activities on FS- or BLM-administered lands. Only 33 percent of existing populations occur on FS- or BLM-administered lands (table 3.29). In general, we believe that all alternatives offer at least minimal protections needed by this species. Alternatives 1 and 5 would offer less protection than other alternatives because of greater timber harvests and road construction associated with these alternatives (table 3.27). Nonetheless, we believe that populations can persist with implementation of any alternative.

Oregon Lakes tui chub *(Gila bicolor oregonensis)*

The Oregon Lakes tui chub is endemic to Oregon's Abert Lake Basin, including the Chewaucan River and XL Spring. Agricultural practices, livestock grazing, and introductions of non-native species are the primary factors affecting this species. Unfortunately, no recent information is available on population status. Tui chubs in nearby Summer Lake Basin have hybridized with chubs from outside the basin, which were presumably introduced as bait fish for introduced rainbow trout. The Summer Basin tui chub, therefore,

is considered to be at high risk of extinction. As tui chub populations in the Chewaucan River occur below trout fisheries, the possibility exists for genetic contamination from introduced fish. The population at XL Spring is on private land and its status is unknown, but we presume it would not be affected by the preliminary draft EIS alternatives. With so little information available, we concluded that an evaluation of alternatives for the Oregon Lake tui chub was not possible at this time.

Leatherside chub *(Gila copei)*

Within the assessment area, the leatherside chub has been reported from the 1940s to the 1970s in widely-scattered areas of the Upper Snake and Big Wood drainages in Idaho. More recent surveys conducted in 1995 (Belk and Wilson 1995) found leatherside chubs in the Goose Creek drainage south of Burley, Idaho, but otherwise no recent collections are known. Because of the scarcity of distribution data and habitat-requirement data, we did not believe that there was sufficient information to perform an analysis of alternatives for this species.

Klamath Basin rare and sensitive fishes

Because of similar distributions, habitat requirements, and/or threats, the following Klamath Basin fishes were considered as one group for our analysis: shortnose sucker *(Chasmistes brevirostris)*, Lost River sucker *(Deltistes luxatus)*, Klamath largescale sucker *(Catostomus snyderi)*, and slender sculpin *(Cottus tenuis)*. The endangered shortnose and Lost River suckers are restricted primarily to Upper Klamath and Agency Lakes except for spawning runs into tributary streams. The Klamath largescale sucker occupies Upper Klamath and Agency Lakes, but also may occur in a resident stream form, inhabiting larger streams such as the Sprague, Sycan, Wood, and Williamson Rivers. The slender sculpin occurs in the same habitats as the catostomids as well as some smaller streams in the Upper Klamath Basin. For considerations of land management activities, all of these taxa are affected by deteriorating water quality in streams and downstream lake habitats. Timber harvesting and associated road-building activities, livestock grazing, and riparian area management are among the primary factors influencing water quality in streams and lakes of the Klamath Basin.

Alternatives 1 through 7—Under Alternative 1 we believe that the Klamath Basin sensitive fishes would continue to decline and would face increasing deterioration of water quality throughout the basin. Timber harvesting and livestock grazing, both of which contribute to deterioration of water quality in the basin, would remain at relatively high levels under Alternative 1. Alternative 2 would tend to maintain existing conditions with little deterioration of habitat quality, but also with little improvement because of low emphasis on restoration efforts. The net impacts of Alternative 3 would be similar to Alternative 2, although Alternative 3 proposes moderate tree harvest and high emphasis on restoration activities. Alternative 4 was rated as the best for the sensitive Klamath Basin fishes because this alternative included the highest levels of restoration activities. Aquatic and riparian habitats in the Klamath Basin have deteriorated substantially from overgrazing by livestock and high levels of timber harvest and road construction. Increased protection and restoration activities are both vital for long-term persistence of sensitive fish species. Restoration efforts would likely provide benefits for endangered and sensitive fishes in the Klamath Basin. Under Alternative 5, we would anticipate continued decline and deterioration of water quality because of moderate to high levels of resource use and low emphasis on restoration programs. For Alternative 5, activities such as livestock grazing, road building, and timber harvesting would be more likely to contribute to the deterioration of water quality given the protection of narrower riparian zones under this alternative. For Alternative 6, we would anticipate results similar to Alternatives 2 and 3 because of lower resource use. Alternative 6 also includes low levels of restoration activities, which results in a lower rating than Alternative 4. Alternative 7 would

result in increased protection of existing habitats and would include a higher level of livestock management as well as a 50 percent reduction in AUMs which should result in a significant reduction in grazing impacts. Overall, Alternative 7 was rated quite high because the broader riparian zones within this alternative's aquatic conservation strategy would provide substantial protection against sediment entering streams and contribute to deterioration of water quality in the Klamath Basin.

Goose Lake sucker (*Catostomus occidentalis lacusanserinus*) and redband trout (*Oncorhynchus mykiss* ssp.) in the Goose Lake Basin

Redband trout in the Goose Lake Basin are a good proxy for the Goose Lake sucker. Both sensitive fishes occur in Goose Lake, tributary streams, and to a lesser extent, in reservoirs in the Goose Lake Basin. Historically, populations of the Goose Lake sucker and redband trout ascended larger streams tributary to Goose Lake in the spring during spawning runs. Both fishes are impacted by livestock grazing, riparian management, and overall water quality. Habitats for both fishes are highly degraded compared to historical conditions. Rangeland management issues are of primary concern for both taxa. Redband trout in the Goose Lake Basin also occur in slightly higher elevation streams than do the Goose Lake suckers and, therefore, may be adversely affected by timber harvest and road construction as well.

Alternatives 1 through 7—Under Alternative 1, conditions would continue to deteriorate. This alternative offers the least protection for rangeland riparian habitats because AUMs would remain relatively high compared to that of other alternatives. Timber harvest levels in Alternative 1 would remain high, negatively affecting headwater populations and downstream water quality (table 3.27). Existing riparian management zones and buffer widths have not proven to be adequate in reducing disturbances from livestock grazing, road building, and timber harvesting. Alternative 2 was rated fair because of increased riparian area protection, but still below most alternatives. Riparian habitat conservation areas for Alternative 2 offer improved protection from adverse impacts associated with livestock grazing when compared to existing conditions. The strength of Alternative 2 is in protection with little emphasis on restoration activities. Alternative 3 also would result in a gradual improvement over existing conditions because of more emphasis on restoration activities and improved riparian zone management through the aquatic conservation strategy. Alternatives 4 and 6 were rated the same and considerably above existing conditions. The higher ratings were warranted because of slightly lower AUMs and slightly higher levels of restoration. For both of these alternatives, improved riparian zone management would decrease impacts associated with livestock grazing. Alternative 5 was rated poorly because of high livestock grazing and little restoration. For Alternative 5, activities such as livestock grazing, road building, and timber harvesting would be more likely to contribute to deterioration of water quality given the narrower protection of riparian zones described for this alternative. Although Alternative 7 would result in greatest reduction in AUMs and most restrictive riparian management standards and guidelines, the effect on the Goose Lake sucker is uncertain as the models for redband trout indicate declines in the Goose Lake Basin. In general, riparian areas would receive the greatest protection under this alternative and have the potential to quickly respond with improved habitat conditions.

Warner sucker (*Catostomus warnerensis*) and redband trout (*Oncorhynchus mykiss* ssp.) in the Warner Basin

The Warner sucker, a threatened species pursuant to the ESA, occupies lake and stream habitats in Oregon's Warner Basin. A small portion of the species range also extends into the California portion of the basin. All remaining populations of the species primarily occur at lower elevations in the basin (table 3.28), and are affected by livestock grazing, riparian area management, and agricul-

tural practices. Approximately 55 percent of the current populations are on BLM-administered rangelands (table 3.29). Lake habitats are dominated by introduced species, which pose additional problems by preying on larval and juvenile Warner suckers. Historical and current distributions of the Warner sucker are largely sympatric with the redband trout native to the Warner Basin, although in one or two localities, redband trout extend their distribution further into headwater areas. We believe that the Warner sucker and Warner Basin form of redband trout can be analyzed together for the purposes of this panel.

Alternatives 1 through 7—Alternative 1 would continue declines of the Warner sucker and redband trout because of relatively high levels of livestock grazing, less emphasis on livestock management, and little riparian restoration. While the number of AUMs would decrease in all alternatives, the least declines are associated with Alternatives 1 and 5, with the greatest decrease in AUMs occurring with Alternative 7. According to our analysis (table 3.27), the treatment level for livestock management is smallest for Alternative 1, moderate for Alternatives 2 to 6, and highest for Alternative 7. A higher level of livestock management should result in better management of grazing and therefore result in fewer impacts to critical riparian habitats. Our analysis of riparian restoration activities (table 3.27) indicates that Alternatives 1 and 2 include very little emphasis on riparian restoration, with high levels of riparian restoration occurring in Alternatives 3 to 7. Overall, Alternative 2 rated slightly higher than current conditions because of improved riparian management and a higher level of livestock management. Alternative 3 also rated higher than existing conditions because of a much greater emphasis on riparian restoration. Riparian areas quickly improve in condition with better protection and restoration programs. Alternatives 4 and 6 were rated the same and considerably above existing conditions. The higher ratings were warranted because of slightly lower AUMs and slightly higher levels of restoration. Alternative 5 was rated poorly because of high livestock grazing. As noted in other discussions, narrower riparian management zones associated with this alternative would be more likely to result in loss of riparian function given higher livestock use. We believe that Alternative 7 would result in the best conditions for the Warner sucker and redband trout in the Warner Basin because this alternative would result in the greatest reduction in AUMs and the most restrictive riparian management standards and guidelines. As a result, riparian areas would receive the greatest protection under this alternative and should quickly respond with improved habitat conditions. Still, we are uncertain that this alternative would prevent declines in habitats and populations of the Warner sucker.

Wood River sensitive fishes

The Wood River sculpin (*Cottus leiopomus*) and Wood River bridgelip sucker (*Catostomus columbianus hubbsi*) are endemic to rivers and streams in Idaho's Big Wood and Little Wood drainages. Although precise distribution information is lacking for the suckers, both species appear to prefer fast-flowing stream and river habitats of high quality. Their ranges are believed to be sympatric over much of the Wood River Basin. Key factors influencing their status include diversions and channelization, loss of riparian habitats, development of floodplains, overgrazing by livestock, and reduced water quality. Approximately 67 percent of existing populations of both fishes occur on FS- or BLM-administered lands (table 3.29). Because of similar ranges, habitat requirements, and threats, we considered both taxa to be subject to the same evaluation of alternatives.

Alternatives 1 through 7—For all alternatives, activities that substantially improve riparian habitat conditions will do the most for persistence of these fishes on Federal lands. Timber harvest and roads will influence water quality, but will not be as important as grazing and riparian management practices for these species that occur in lower-elevation portions of the drainages. Under Alternative 1, we believe that many of the factors that have resulted in declines of these taxa would

continue. Timber harvest levels and grazing levels would be highest under this alternative, which would contribute to continued loss of riparian function and reduced water quality. For Alternative 2, timber harvest would be the lowest of any alternatives (only Alternative 7 is equally low) and levels of livestock management would be moderate (Alternatives 2 through 6 would have equal levels of livestock management activities, see table 3.27). Riparian restoration activities would be low for Alternative 2. Overall, conditions for Wood River sensitive fishes should improve under Alternative 2 compared to existing conditions. Habitat conditions under Alternative 3 also should improve compared to existing conditions, but with slightly more timber harvest and riparian restoration activities. Management under Alternatives 4 and 6 also should improve conditions compared to existing habitat quality. Both Alternatives 4 and 6 should result in improvements for these sensitive fishes. We believe that under Alternative 5, impacts of livestock grazing and timber harvest would continue to cause problems and loss of habitat quality. The combination of narrow riparian management zones with relatively high levels of livestock grazing and timber harvest would be detrimental to these fishes. Overall, trends of sensitive fishes would be similar between Alternative 5 and existing conditions. Alternative 7 would have lowest AUMs and highest levels of livestock management activities of any alternative, which would result in the highest relative improvement of riparian conditions. Alternative 7 also would have the lowest timber harvest levels. Overall, Alternative 7 would be the most beneficial for these species, although their status also should improve under Alternatives 2, 3, 4, and 6.

Malheur sculpin (*Cottus bairdi* ssp.) and redband trout (*Oncorhynchus mykiss* ssp.) in the Harney Basin

The Malheur sculpin is endemic to streams in Oregon's Harney Basin. This sculpin requires coolwater streams of high quality. High levels of sediments are not tolerated. Within Harney Basin, the distribution of the Malheur sculpin is sympatric with that of the redband trout. Both the Malheur sculpin and redband trout are adversely affected by activities that increase water temperature, turbidity, and sediment loads. Livestock grazing, road building, and timber harvesting are primary activities affecting these taxa on FS- and BLM-administered lands. Because of similarity in distribution, habitat requirements, and threats, we considered both taxa to be subject to the same evaluation of alternatives. The form of redband trout in Harney Basin is often considered to be distinct because of its extended isolation from other stocks.

Alternatives 1 through 7—Under Alternative 1 we believe that conditions for the Malheur sculpin and redband trout would continue to deteriorate and that this alternative offers the least protection for rangeland riparian habitats because AUMs would only decrease slightly compared to that of other alternatives. Alternative 1 also includes the highest level of timber harvest of any alternative within the range of the Malheur sculpin (table 3.27). Alternative 2 is rated higher than existing conditions because of increased riparian area protection and reduced timber harvest. We believe that Alternative 3 also would result in improvements from existing conditions because of more emphasis on riparian restoration activities. Alternatives 4 and 6 were rated the same and much above existing conditions. The higher ratings were warranted because of slightly lower AUMs and slightly higher levels of restoration. Alternative 5 was rated lower because of higher levels of livestock grazing. As noted in discussions of other sensitive fishes, the narrower riparian management areas associated with Alternative 5 coupled with relatively high levels of livestock grazing would decrease proper functioning condition of riparian areas. We believe that Alternative 7 would result in the best conditions for the Harney Basin sensitive fishes because it would result in the greatest reduction in AUMs, lowest timber harvest levels, highest level of livestock management, and most restrictive riparian management standards and guidelines. As a result, riparian areas would receive the

greatest protection under this alternative and should quickly respond with improved habitat conditions. All Alternatives except 1 and 5 should improve conditions for these sensitive fishes, yet the ability of even the most protective alternatives to prevent declines in habitats and populations remains uncertain.

Torrent sculpin (*Cottus rhotheus*)

Historically, torrent sculpin were widely distributed within the Columbia River drainage. Many of the cold, clear waters preferred by the torrent sculpin and other species (such as, shorthead sculpin, bull trout, westslope cutthroat trout, and redband trout) have been degraded by timber harvest and associated road construction. Although the current distribution of torrent sculpin clearly has declined, our knowledge is limited because in much of the assessment area, sculpins often are reported generically as *Cottus* sp. with little attention paid to specific identification. The species prefers coldwater streams and smaller rivers, and typically occurs at lower elevations than the shorthead sculpin. Approximately 52 percent of the existing populations occur on FS- or BLM-administered lands (table 3.29). We believe that westslope cutthroat trout are an appropriate proxy for torrent sculpin in that they occupy many of the same habitats and have similar requirements for cold, high-quality habitat conditions. There is a strong association between the distributions of westslope cutthroat trout and torrent sculpin (chi-square test of independence, $P < 0.01$). Refer to section "Projected Effects on Widely-Distributed Salmonid Species" on westslope cutthroat trout for a discussion of how alternatives would affect torrent sculpin. Unlike westslope cutthroat or redband trout, however, torrent sculpin have less vagility (that is, less capacity or tendency to become widely dispersed). Once eliminated from a river system, they are unlikely to recolonize without artificial assistance. Alternatives with high riparian zone protection would be most advantageous for this species. For restoration efforts to be successful, transplants of the torrent sculpin into restored areas would likely be necessary.

Shorthead sculpin (*Cottus confusus*)

Historically, shorthead sculpin were widely distributed within the Columbia River drainage. In the lower Columbia River drainage, they are known from the Deschutes, Yakima, Wenatchee, and John Day River drainages. In the mid and upper Columbia River drainage, shorthead sculpin are known from the Snake, Spokane, Pend Oreille, Kootenai, Coeur d'Alene, and St. Joe River drainages. Many of the cold, clear waters preferred by this species have been degraded by timber harvest and associated road construction. Although the current distribution of shorthead sculpin clearly has declined, our knowledge is limited because in much of the assessment area, sculpins often are reported generically as *Cottus* sp. with little attention paid to specific identification. The species prefers coldwater streams and smaller rivers, and typically occurs at higher elevations than the torrent sculpin. Approximately 66 percent of existing populations occur on FS- or BLM-administered lands (table 3.29). We believe that bull trout are an appropriate proxy for shorthead sculpin in that they occupy many of the same habitats and have similar requirements for cold, high-quality habitat conditions. There is a strong association between the distributions of bull trout and shorthead sculpin (chi-square test of independence, $P < 0.01$). Refer to "Findings by Species, Bull trout" section of this chapter for a discussion of how alternatives would affect shorthead sculpin. Unlike bull trout, however, shorthead sculpin have low vagility. Once eliminated from a river system, they are unlikely to recolonize without artificial assistance. Alternatives with high riparian zone protection would be most advantageous for this species. For restoration efforts to be successful, transplants of the shorthead sculpin into restored areas likely would be necessary.

Margined sculpin (*Cottus marginatus*)

The margined sculpin is restricted to streams in the Blue Mountains portion of the middle Columbia River drainage. Like many sculpins,

they are relatively poorly known and subjected to lumping as *Cottus* sp. in collections. Current information indicates that only about 13 percent of existing populations occur on FS- or BLM-administered lands (table 3.29). Within their range, they occur sympatrically with redband trout. Redband trout should be a good proxy for this species because both occupy similar habitats and are adversely affected by increases in water temperature, turbidity, and stream sedimentation. There is a strong association between the distributions of redband trout and margined sculpin (chi-square test of independence, $P < 0.01$). Therefore, we used redband trout as a proxy for margined sculpin in this analysis. Refer to "Findings by Species, Redband trout" section for a discussion of how alternatives would affect the margined sculpin. Unlike redband trout, however, margined sculpin have less vagility. Once eliminated from a river system, they are unlikely to recolonize without artificial assistance. Alternatives with high riparian zone protection would be most advantageous for this species. For restoration efforts to be successful, transplants of the margined sculpin into restored areas would likely be necessary.

Aquatic Mollusk Species

There are five federally listed (status, endangered) aquatic snails that are found in the Basin (Frest and Johannes 1995). They are:

Lanx n. sp. 1 (Banbury Springs lanx)
Physa natricina (Snake River physa)
Pyrgulopsis idahoensis (Idaho springsnail)
Taylorconcha serpenticola (Bliss Rapids springsnail)
Valvata utahensis (desert valvata)

According to Frest and Johannes (1995), the Banbury Springs lanx, Bliss Rapids springsnail, and desert valvata may occur on federally administered lands in Idaho (specifically, BLM). For each of these three species, we provide a brief summary of the reasons that we did not complete a viability analysis for the UCRB planning area.

Banbury Springs lanx (*Lanx* n. sp. 1)

This species occurs in only three known populations in the Snake River drainage in Gooding County, Idaho. It is considered a very local endemic that is threatened primarily by agricultural and fish-farm runoff and water diversions. Because of the very local distribution of the species, the alternatives in the UCRB preliminary draft EIS will not be site specific (fine scale) enough to determine the effect on viability. This analysis and determination should be done on a site-specific, project basis rather than on a landscape scale.

Bliss Rapids springsnail (*Taylorconcha serpenticola*)

The current distribution of this species is limited to very few sites within the original range. The original range was a limited reach of the middle Snake River, from Indian Cove Bridge to Twin Falls, Idaho. Most spring and river populations have been extirpated or are much reduced. Threats to this species have been the diversion or capping of springs and surface water and groundwater pollution from agricultural runoff. Because of the very limited distribution of this species, as with the Banbury Springs lanx, it is not appropriate to look at viability at the landscape scale. This should be done at a site-specific, project level.

Desert valvata (*Valvata utahensis*)

The distribution of this species has become very limited and has been extirpated in much of its original range. It is currently found in a "couple of Snake River sites" and spring-fed pools with no outlets (Frest and Johannes 1995). It is considered a local endemic. The pollution of surface and groundwater from agricultural runoff and the impoundments of rivers continue to threaten the species. The taxon is continuing to decline. The very limited number and distribution of the species make it inappropriate to do a viability

analysis at the landscape scale. The assessment of viability needs to be done at a site-specific, project level.

All three of these species are local endemics with very limited distribution and numbers. The science assessments and preliminary draft EISs are focused on a landscape or a large watershed scale. Direction in the alternatives is unlikely to be so specific that effects on these species would be identifiable or predictable. The major threats to these species are linked primarily to agriculture and river impoundments, and are outside of the management authority of the BLM. Therefore, we feel it is not valid to attempt to do a viability analysis given the scale of our data and the scale of the decisions to be made. Local administrative units have the opportunity to analyze the effects of proposed projects on these species and determine management needs to protect them from potential activities.

Summary of Aquatic Habitats and Native Species Evaluation of Alternatives

Evaluation of the ICBEMP aquatic conservation strategies and the expected effect of each alternative on the future habitats, population status, and distribution of 7 key salmonids and 18 rare and sensitive fishes are very complex. Each piece of information used in our evaluation provided some sense of where and how much of the anticipated change in management is likely to influence each of the species considered. Each piece of information has important limitations, and represents only a single element in this larger and very complex picture. Our conclusions are drawn from the strength and consistency of trends adapted from the models, the patterns in allocation of roads and other land disturbing activities, the allocation of restoration activities, and the mitigation of disturbance expected through riparian and ecosystem objectives and standards, as well as specific direction given in each alternative.

The evaluation by species centered on each alternatives' ability to conserve core and fringe areas, prevent declines in habitat and populations, and rehabilitate habitats and depressed populations. Core areas are concentrations of strong populations, and are areas where the species is well distributed among adjacent watersheds. Fringe areas are where comparatively few occupied watersheds are isolated and fragmented from the larger portions of the species range, but have high genetic integrity or potentially unique genetic characteristics which aid the robustness of the species.

The expected response of a species to any alternative is complex, and the answer to each of a set of evaluation questions for every alternative represents a judgment on our part given the weight of the evidence presented. For example, with Alternative 5, the answer to the question "will strong populations in the central or core areas for bull trout be conserved?" was "no", yet strongholds associated with Category 1 watersheds should fare well under this alternative. The proportion of wilderness and emphasis on ecosystem analysis and restoration are focused to benefit strong populations under this alternative, and will likely sustain and even expand the distribution of bull trout within these select subbasins. However, areas which emphasize commodity production (for example, eastern Oregon and the northern one-third of the UCRB planning area) occupy larger areas of the species range, and our data suggest that populations here will not fare well, leading us to a negative conclusion. Exceptions are found within all of our summary determinations. If we could not assign a "yes" or "no" answer because of insufficient information or multiple factors leading to uncertainty, we responded with "uncertain."

Our summary is based on professional interpretation of both quantitative and qualitative information collected for the purpose of the alternative evaluation or generated as part of the broader scientific assessment (Lee and others, in press). From table 3.31, it is clear thar Alternatives 1 and 5 would not sustain aquatic and riparian ecosystem structure and function through time, nor would they adequately protect the key salmonid species or the rare and sensitive species. Alternatives 2, 3,

4, 6, and 7 would sustain and restore aquatic and riparian ecosystems through time, but would have mixed results for both key salmonids and rare and sensitive species. The response of the key salmonids to Alternatives 2, 3, 4, 6, and 7 would be more complex, yet consistent with the ratings for the aquatic conservation strategies. More species would fare better under Alternatives 4, 6, and 7 than under Alternatives 2 and 3. The aquatic conservation strategy ratings, based on combined evaluation of interim RMA widths, specific direction regarding performance measures, and whether an ecosystem analysis is required in strongholds and high-priority watersheds, are highest for Alternatives 4, 6, and 7. Alternatives 2 and 3 do not include major restoration efforts or an ecosystem analysis requirement. They appeared to provide little more than a comprehensive project analysis and therefore, rate somewhat lower.

It is uncertain whether any of the alternatives would conserve fringe populations and habitats for the anadromous salmonids (such as, steelhead trout, stream-type chinook, and ocean-type chinook). Uncertainty also exists concerning preventing population declines and rebuilding depressed areas for these species. Most of these populations are depressed or federally listed and are significantly influenced by hydroelectric dams, ocean conditions, hatcheries, and land management activities outside of Federal lands. Ocean chinook are proportionately more affected by a large number of factors that operate outside of Federal lands in freshwater, estuaries, and the ocean environment. All of their migration corridors between freshwater spawning and rearing habitats and the ocean lie on private or tribal lands. The most conservative approach to conserving and restoring watersheds would be provided by Alternatives 6 and 7. Given the effects of non-Federal land conditions and activities, the halting of declines and rebuilding of anadromous fish populations requires focused and coordinated efforts by several national, regional, and state agencies and institutions.

Table 3.31. Summary of aquatic habitats and native fishes evaluation of preliminary draft alternatives.

Number of key salmonid species and rare and sensitive fishes given sufficient protection to:	Alternative 1			Alternative 2			Alternative 3			Alternative 4			Alternative 5			Alternative 6			Alternative 7		
6 Key Salmonid Species[1]	**Y**	**N**	**U**	**Y**	**N**	**U**	**Y**	**N**	**U**	**Y**	**N**	**U**	**Y**	**N**	**U**	**Y**	**N**	**U**	**Y**	**N**	**U**
Conserve strong populations	0	6	0	5	1	0	4	0	2	6	0	0	0	6	0	6	0	0	6	0	0
Prevent declines	0	6	0	0	6	0	0	4	2	1	1	4	0	6	0	3	0	3	2	1	3
Rebuild depressed populations	0	6	0	4	2	0	6	0	0	6	0	0	4	2	0	6	0	0	6	0	0
15 Rare and Sensitive Species[2]																					
Prevent declines	1	14	0	7	7	1	7	3	5	7	1	7	1	14	0	8	0	7	9	0	6
Does the aquatic conservation strategy maintain and restore aquatic and riparian ecological processes through time?	No			Yes			Yes			Yes			No, in commodity-emphasis areas			Yes			Yes		

[1]Ocean-type chinook are minimally impacted by FS and BLM lands and no core strongholds exist on FS or BLM lands. They are, therefore, not included in this summary.

[2]Three of the 18 rare and sensitive fishes addressed in the evaluation were not included in this summary because one species is protected under the ESA, Section 7, regardless of the alternative, and two species have insufficient information to conduct an analysis. Also of note, pygmy whitefish are large, lake-dwelling fish that would be minimally impacted by any alternative.

U = Uncertain; Y = Yes; N = No

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Appendix 3-A.

Aquatic/Riparian Evaluation of Alternatives Workshop participants. Workshop was held in Boise, Idaho, from March 6 to 13, 1996.

ICBEMP Science Integration Team Members:

Jim Sedell - USFS, Corvallis, Oregon
Danny Lee - USFS, Boise, Idaho
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Sandy Noble - USFWS, Leavenworth, Washington
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Support:

Scott Leonard - USFS, Emmett, Idaho
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Venetia Gempler - USFS, Boise, Idaho
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Appendix 3-B

Classification trees used for predicting species status.

Classification trees were developed using the approach outlined by Lee and others (in press) in order to project status under each of the alternatives. Table B.1 describes the variables used in tree development. The remaining sections summarize tree structure. Figures B.1 to B.8 graphically show tree structure. All classification trees except that developed for ocean-type chinook were sensitive to road-density measures. Future predictions were made using the projected road-density layers.

Table B.1. Descriptions of landscape variables used in the abbreviated analysis of fish distribution. All values expressed as percents refer to the percent area of the subwatershed.

Variable Name	Description
eru	Ecological Reporting Unit
Physiographic and Geophysical Variables	
slope	area weighted average midslope
pprecip	mean annual precipitation (PRISM)
elev	mean elevation (ft)
mtemp	mean annual temperature
solar	mean annual solar radiation
drnden	drainage density (mi/mi2)
anadac	access for anadromous fish (0 = no, 1 = yes)
dampass	number of intervening dams
hucorder	number of upstream 6th-code hydrologic units
hk	soil texture coefficient
baseero	base erosion index
ero	surface erosion hazard
bank	streambank erosion hazard
Ownership and Management Variables	
rdmean0	mean road density
rdmed0	median road density class
rdgeo0	geometric mean road density
mgclus	management classification

Bull trout presence/absence, two-step model

Summary

Variables used in tree construction: "mtemp" "rdgeo0" "hucorder" "pprecip" "eru"
Number of terminal nodes: 7
Residual mean deviance: 0.9658 = 2617 / 2710
Misclassification error rate: 0.2172 = 590 / 2717

Figure B.1. Tree structure

Node) Split criterion	Sample size	Deviance	Mode	Absent	Present
1) root	2717	3279.00	A	(0.7085	0.2915)
2) mtemp<5.08	1475	2024.00	A	(0.5586	0.4414)
4) rdgeo0<0.893289	951	1314.00	P	(0.4669	0.5331)
8) hucorder<16.5	842	1145.00	P	(0.4181	0.5819)
16) pprecip<593.731	116	142.10	A	(0.6983	0.3017) *
17) pprecip>593.731	726	959.30	P	(0.3733	0.6267) *
9) hucorder>16.5	109	94.38	A	(0.8440	0.1560) *
5) rdgeo0>0.893289	524	616.20	A	(0.7252	0.2748)
10) hucorder<0.5	296	252.30	A	(0.8480	0.1520) *
11) hucorder>0.5	228	312.10	A	(0.5658	0.4342)
22) eru<7.5	104	121.20	A	(0.7308	0.2692) *
23) eru>7.5	124	169.30	P	(0.4274	0.5726) *
3) mtemp>5.08	1242	878.90	A	(0.8865	0.1135) *

* denotes terminal node

Bull trout status

Summary

Variables used in tree construction: "rdgeo0" "solar" "baseero" "drnden" "bank" "rdmean0" "eru"
Number of terminal nodes: 8
Residual mean deviance: 0.723 = 566.8 / 784
Misclassification error rate: 0.1427 = 113 / 792

Figure B.2. Tree Structure

Node) Split criterion	Sample size	Deviance	Mode	Depressed	Present
1) root	792	821.20	D	(0.7866	0.2134)
2) rdgeo0<0.027454	198	274.30	S	(0.4848	0.5152)
4) solar<242.706	20	0.00	D	(1.0000	0.0000) *
5) solar>242.706	178	242.900	S	(0.4270	0.5730)
10) baseero<59.6157	145	201.000	D	(0.5034	0.4966)
20) drnden<1.30505	95	123.900	D	(0.6421	0.3579) *
21) drnden>1.30505	50	55.110	S	(0.2400	0.7600) *
11) baseero>59.6157	33	20.110	S	(0.0909	0.9091) *
3) rdgeo0>0.027454	594	418.600	D	(0.8872	0.1128)
6) bank<51.8028	109	124.200	D	(0.7431	0.2569) *
7) bank>51.8028	485	271.400	D	(0.9196	0.0804)
14) rdmean0<2.87869	411	257.900	D	(0.9051	0.0949)
28) eru<2.5	5	5.004	S	(0.2000	0.8000) *
29) eru>2.5	406	238.500	D	(0.9138	0.0862) *
15) rdmean0>2.87869	74	0.000	D	(1.0000	0.0000) *

* denotes terminal node

Westslope cutthroat trout status

Summary

Variables used in tree construction: "anadac" "mngclus" "rdgeo0" "hk" "solar" "rdmean0" "bank" "pprecip" "mtemp" "hucorder" "xisq0" "slope"
Number of terminal nodes: 19
Residual mean deviance: 1.165 = 1888 / 1621
Misclassification error rate: 0.214 = 351 / 1640

Figure B.3. Tree structure

Node) split criterion	Sample size	Deviance	Mode	Absent	Depressed	Strong
1) root	1640	3108.00	D	(0.19630	0.60240	0.20120)
2) anadac<0.5	1057	1511.00	D	(0.07852	0.75210	0.16930)
4) mngclus:FG,FH,FM,FW	631	908.40	D	(0.03645	0.70210	0.26150)
8) rdgeo0<0.276237	207	320.90	S	(0.01932	0.48790	0.49280)
16) hk<0.207	33	20.11	D	(0.00000	0.90910	0.09091) *
17) hk>0.207	174	269.10	S	(0.02299	0.40800	0.56900)
34) solar<234.838	43	50.92	D	(0.00000	0.72090	0.27910) *
35) solar>234.838	131	194.00	S	(0.03053	0.30530	0.66410)
70) rdmean0<0.486637	68	70.25	S	(0.05882	0.08824	0.85290) *
71) rdmean0>0.486637	63	86.94	D	(0.00000	0.53970	0.46030) *
9) rdgeo0>0.276237	424	505.20	D	(0.04481	0.80660	0.14860)
18) bank<59.4293	31	65.08	D	(0.19350	0.41940	0.38710) *
19) bank>59.4293	393	413.90	D	(0.03308	0.83720	0.12980) *
5) mngclus:NP,PA,PF,PR,TL	426	465.20	D	(0.14080	0.82630	0.03286)
10) pprecip<527.034	106	142.00	D	(0.31130	0.67920	0.00943)
20) solar<296.847	98	121.90	D	(0.25510	0.73470	0.01020) *
21) solar>296.847	8	0.00	A	(1.00000	0.00000	0.00000) *
11) pprecip>527.034	320	291.60	D	(0.08438	0.87500	0.04063) *
3) anadac>0.5	583	1261.00	A	(0.40990	0.33100	0.25900)
6) mtemp<5.809	434	940.50	D	(0.26040	0.40090	0.33870)
12) rdmean0<0.0484976	136	260.00	S	(0.30880	0.13240	0.55880)
24) hucorder<26	117	212.30	S	(0.21370	0.15380	0.63250) *
25) hucorder>26	19	12.79	A	(0.89470	0.00000	0.10530) *
13) rdmean0>0.0484976	298	609.30	D	(0.23830	0.52350	0.23830)
26) solar<265.875	41	59.42	S	(0.12200	0.12200	0.75610)
52) rdmean0<2.75627	30	17.47	S	(0.03333	0.03333	0.93330) *
53) rdmean0>2.75627	11	23.98	A	(0.36360	0.36360	0.27270) *
27) solar>265.875	257	488.90	D	(0.25680	0.58750	0.15560)
54) xisq0<360.367	103	127.20	D	(0.04854	0.79610	0.15530) *
55) xisq0>360.367	154	313.00	D	(0.39610	0.44810	0.15580)
110) solar<325.618	62	106.40	A	(0.64520	0.25810	0.09677) *
111) solar>325.618	92	179.20	D	(0.22830	0.57610	0.19570)
222) slope<34.3295	84	152.00	D	(0.22620	0.63100	0.14290) *
223) slope>34.3295	8	8.997	S	(0.25000	0.00000	0.75000) *
7) mtemp>5.809	149	149.50	A	(0.84560	0.12750	0.02685)
14) mngclus:FH,FW,PA,PF,PR	129	65.28	A	(0.93020	0.06977	0.00000) *
15) mngclus:FG,FM,TL	20	41.19	D	(0.30000	0.50000	0.20000) *

* denotes terminal node

Yellowstone cutthroat trout status

Summary

Variables used in tree construction: "rdgeo0" "drnden" "mtemp" "mngclus" "hucorder"
Number of terminal nodes: 7
Residual mean deviance: 1.031 = 399.1 / 387
Misclassification error rate: 0.2208 = 87 / 394

Figure B.4. Tree structure

Node) split criterion	Sample size	Deviance	Mode	Absent	Depressed	Strong
1) root	394	846.30	S	(0.26900	0.29190	0.4391)
2) rdgeo0<0.140255	161	160.50	S	(0.00621	0.17390	0.8199)
4) drnden<0.99565	87	10.92	S	(0.01149	0.00000	0.9885)*
5) drnden>0.99565	74	98.16	S	(0.00000	0.37840	0.6216)*
3) rdgeo0>0.140255	233	481.30	A	(0.45060	0.37340	0.1760)
6) mtemp<6.1345	180	378.00	D	(0.29440	0.47780	0.2278)
12) mngclus:FG,PF	58	94.75	D	(0.03448	0.51720	0.4483)
24) hucorder<10.5	45	64.63	D	(0.02222	0.66670	0.3111)*
25) hucorder>10.5	13	7.05	S	(0.07692	0.00000	0.9231)*
13) mngclus:BR,FH,FM,PA,PR,TL	122	239.10	D	(0.41800	0.45900	0.1230)
26) drnden<1.55755	66	120.20	A	(0.62120	0.24240	0.1364)*
27) drnden>1.55755	56	88.18	D	(0.17860	0.71430	0.1071)*
7) mtemp>6.1345	53	9.92	A	(0.98110	0.01887	0.0000)*

* denotes terminal node

Redband trout status

Summary

Variables used in tree construction: "mngclus" "mtemp" "hucorder" "eru" "elev" "anadac" "rdgeo0"
Number of terminal nodes: 14
Residual mean deviance: 1.471 = 2577 / 1752
Misclassification error rate: 0.3596 = 635 / 1766

Figure B.5 Tree Structure

Node) split criterion	Sample size	Deviance	Mode	Absent	Depressed	Strong
1) root	1766	3530.00	A	(0.46720	0.39130	0.14160)
2) mngclus:BR,FM,PA,PR1243	1243	2085.00	A	(0.60180	0.33950	0.05873)
4) mtemp<6.822	365	696.50	D	(0.40000	0.49320	0.10680)
8) hucorder<1.5	258	486.70	A	(0.47290	0.43020	0.09690) *
9) hucorder>1.5	107	189.20	D	(0.22430	0.64490	0.13080)
18) eru<11.5	95	153.10	D	(0.25260	0.67370	0.07368) *
19) eru>11.5	12	16.30	S	(0.00000	0.41670	0.58330) *
5) mtemp>6.822	878	1299.00	A	(0.68560	0.27560	0.03872)
10) mtemp<10.1465	775	1203.00	A	(0.65160	0.30580	0.04258)
20) elev<5493.5	731	1072.00	A	(0.67170	0.29820	0.03010)
40) hucorder<0.5	383	442.90	A	(0.77280	0.21670	0.01044)
80) mngclus:FM,PA	106	146.30	A	(0.53770	0.46230	0.00000) *
81) mngclus:BR,PR	227	247.10	A	(0.86280	0.12270	0.01444) *
41) hucorder>0.5	348	588.20	A	(0.56030	0.38790	0.05172)
82) hucorder<144	308	537.80	A	(0.50320	0.43830	0.05844)
164) mtemp<7.126	46	60.39	A	(0.78260	0.15220	0.06522) *
165) mtemp>7.126	262	457.00	D	(0.45420	0.48850	0.05725) *
83) hucorder>144	40	0.00	A	(1.00000	0.00000	0.00000) *
21) elev>5493.5	44	94.47	D	(0.31820	0.43180	0.25000) *
11) mtemp>10.1465	103	51.17	A	(0.94170	0.04854	0.00971) *
3) mngclus:FG,FH,FW,PF,TL	523	1036.00	D	(0.14720	0.51430	0.33840)
6) anadac<0.5	404	680.90	D	(0.05446	0.57920	0.36630)
12) elev<3188	34	55.70	S	(0.23530	0.08824	0.67650) *
13) elev>3188	370	580.60	D	(0.03784	0.62430	0.33780)
26) rdgeo0<0.118466	89	148.50	S	(0.04494	0.40450	0.55060) *
27) rdgeo0>0.118466	281	408.00	D	(0.03559	0.69400	0.27050) *
7) anadac>0.5	119	252.40	A	(0.46220	0.29410	0.24370) *

* denotes terminal node

Steelhead status

Summary

Variables used in tree construction: "hucorder" "dampass" "elev" "eru" "rdgeo0"
Number of terminal nodes: 17
Residual mean deviance: 0.8778 = 1175 / 1338
Misclassification error rate: 0.1528 = 207 / 1355

Figure B.6 Tree structure

Node) Split criterion	Sample size	Deviation	Mode	Absent	Depressed	Migration	Strong
1) root	1355	2400.00	D	(0.13140	0.68710	0.16680	0.01476)
2) hucorder<21.5	1064	1419.00	D	(0.16730	0.78480	0.02914	0.01880)
4) hucorder<0.5	563	809.20	D	(0.26110	0.70870	0.00888	0.02131)
8) dampass<3.5	144	104.60	D	(0.03472	0.90970	0.00000	0.05556)
16) elev<4935.5	116	41.22	D	(0.04310	0.95690	0.00000	0.00000)*
17) elev>4935.5	28	33.50	D	(0.00000	0.71430	0.00000	0.28570)*
9) dampass>3.5	419	628.30	D	(0.33890	0.63960	0.01193	0.00955)
18) elev<3432.5	66	92.16	A	(0.66670	0.31820	0.01515	0.00000)*
19) elev>3432.5	353	499.30	D	(0.27760	0.69970	0.01133	0.01133)
38) eru<6.5	152	150.80	D	(0.13160	0.84870	0.00658	0.01316)
76) eru<5.5	54	85.38	D	(0.35190	0.61110	0.00000	0.03704)*
77) eru>5.5	98	22.30	D	(0.01020	0.97960	0.01020	0.00000)*
39) eru>6.5	201	317.00	D	(0.38810	0.58710	0.01493	0.00995)
78) rdgeo0<0.0206938	71	83.25	D	(0.21130	0.77460	0.01408	0.00000)*
79) rdgeo0>0.0206938	130	215.90	A	(0.48460	0.48460	0.01538	0.01538)
158) elev<6237.5	70	121.50	D	(0.32860	0.61430	0.02857	0.02857)*
159) elev>6237.5	60	76.38	A	(0.66670	0.33330	0.00000	0.00000)*
5) hucorder>0.5	501	513.70	D	(0.06188	0.87030	0.05190	0.01597)
10) elev<1427	19	29.11	M	(0.05263	0.26320	0.68420	0.00000)*
11) elev>1427	482	422.50	D	(0.06224	0.89420	0.02697	0.01660)*
3) hucorder>21.5	291	369.00	M	(0.00000	0.32990	0.67010	0.00000)
6) hucorder<121	127	170.30	D	(0.00000	0.60630	0.39370	0.00000)
12) elev<1053.5	9	0.00	M	(0.00000	0.00000	1.00000	0.00000)*
13) elev>1053.5	118	152.40	D	(0.00000	0.65250	0.34750	0.00000)
26) eru<6.5	51	28.04	D	(0.00000	0.92160	0.07843	0.00000)*
27) eru>6.5	67	92.15	M	(0.00000	0.44780	0.55220	0.00000)
54) hucorder<65	54	74.19	D	(0.00000	0.55560	0.44440	0.00000)
108) elev<4564.5	24	26.99	M	(0.00000	0.25000	0.75000	0.00000)*
109) elev>4564.5	30	30.02	D	(0.00000	0.80000	0.20000	0.00000)*
55) hucorder>65	13	0.00	M	(0.00000	0.00000	1.00000	0.00000)*
7) hucorder>121	164	117.60	M	(0.00000	0.11590	0.88410	0.00000)
14) dampass<2.5	16	19.87	D	(0.00000	0.68750	0.31250	0.00000)*
15) dampass>2.5	148	62.24	M	(0.00000	0.05405	0.94590	0.00000)*

* denotes terminal node

Ocean-type chinook salmon status

Summary

Variablesused in tree construction: "hucorder" "elev" "dampass" "eru"
Number of terminal nodes: 11
Residual mean deviance: 0.5208 = 116.1 / 223
Misclassification error rate: 0.07265 = 17 / 234

Figure B.7. Tree structure

Node) Split criterion	Sample size	Deviation	Mode	Absent	Depressed	Migration	Strong
1) root	234	585.00	A	(0.4444	0.21790	0.25210	0.08547)
2) hucorder<1080	171	365.00	A	(0.6082	0.20470	0.07602	0.11110)
4) hucorder<5.5	90	81.49	A	(0.8667	0.02222	0.11110	0.00000)
8) elev<2113	23	31.490	A	(0.5652	0.00000	0.43480	0.00000)
16) dampass<3.5	9	6.279	M	(0.1111	0.00000	0.88890	0.00000)*
17) dampass>3.5	14	11.48	A	(0.8571	0.00000	0.14290	0.00000)*
9) elev>2113	67	17.99	A	(0.9701	0.02985	0.00000	0.00000)*
5) hucorder>5.5	81	193.20	D	(0.3210	0.40740	0.03704	0.23460)
10) dampass<7.5	34	75.77	S	(0.2353	0.14710	0.05882	0.55880)
20) eru<3.5	14	11.48	S	(0.0000	0.00000	0.14290	0.85710)*
21) eru>3.5	20	43.22	A	(0.4000	0.25000	0.00000	0.35000)
42) dampass<2.5	11	14.42	S	(0.0000	0.36360	0.00000	0.63640)
84) elev<1888.5	6	0.000	S	(0.0000	0.00000	0.00000	1.00000)*
85) elev>1888.5	5	5.004	D	(0.0000	0.80000	0.00000	0.20000 *
43) dampass>2.5	9	6.279	A	(0.8889	0.11110	0.00000	0.00000)*
11) dampass>7.5	47	71.26	D	(0.3830	0.59570	0.02128	0.00000)
22) elev<3145.5	30	28.06	D	(0.1000	0.86670	0.03333	0.00000)*
23) elev>3145.5	17	12.32	A	(0.8824	0.11760	0.00000	0.00000)*
3) hucorder>1080	63	81.08	M	(0.0000	0.25400	0.73020	0.01587)
6) elev<2103.5	46	9.635	M	(0.0000	0.00000	0.97830	0.02174)*
7) elev>2103.5	17	7.606	D	(0.0000	0.94120	0.05882	0.00000)*

* denotes terminal node

Stream-type chinook salmon status

Summary

Variables used in tree construction: "hucorder" "mtemp" "elev" "rdgeo0" "dampass" "rdmean0" "eru"

Number of terminal nodes: 17

Residual mean deviance: 1.107 = 1399 / 1264

Misclassification error rate: 0.2272 = 291 / 1281

Figure B.8. Tree structure

Node) Split criterion	Sample size	Deviation	Mode	Absent	Depressed	Migration	Strong
1) root	1281	2756.00	A	(0.44420	0.35910	0.19050	0.00625)
2) hucorder<29.5	1006	1670.00	A	(0.55670	0.40760	0.02783	0.00795)
4) hucorder<0.5	509	627.30	A	(0.76230	0.21810	0.01965	0.00000)
8) mtemp<5.7595	340	454.30	A	(0.69120	0.29710	0.01176	0.00000)*
9) mtemp>5.7595	169	127.00	A	(0.90530	0.05917	0.03550	0.00000)
18) elev<1537.5	16	17.99	A	(0.75000	0.00000	0.25000	0.00000)*
19) elev>1537.5	153	94.94	A	(0.92160	0.06536	0.01307	0.00000)*
5) hucorder>0.5	497	854.40	D	(0.34610	0.60160	0.03622	0.01610)
10) mtemp<7.461	365	545.30	D	(0.22190	0.72880	0.02740	0.02192)
20) rdgeo0<0.8215135	211	289.40	D	(0.16110	0.78200	0.03791	0.01896)
40) dampass<3.5	17	29.71	D	(0.11760	0.64710	0.00000	0.23530)*
41) dampass>3.5	194	237.50	D	(0.16490	0.79380	0.04124	0.00000)
82) hucorder<11.5	166	191.50	D	(0.19280	0.78920	0.01807	0.00000)
164) rdgeo0<0.0645532	97	83.42	D	(0.10310	0.87630	0.02062	0.00000)*
165) rdgeo0>0.0645532	69	96.07	D	(0.31880	0.66670	0.01449	0.00000)
330) elev<5682.5	31	28.34	D	(0.09677	0.87100	0.03226	0.00000)*
331) elev>5682.5	38	52.68	A	(0.50000	0.50000	0.00000	0.00000)*
83) hucorder>11.5	28	26.28	D	(0.00000	0.82140	0.17860	0.00000)*
21) rdgeo0>0.8215135	154	243.40	D	(0.30520	0.65580	0.01299	0.02597)*
11) mtemp>7.461	132	204.00	A	(0.68940	0.25000	0.06061	0.00000)
22) eru<3.5	19	31.34	D	(0.21050	0.68420	0.10530	0.00000)*
23) eru>3.5	113	150.00	A	(0.76990	0.17700	0.05310	0.00000)*
3) hucorder>29.5	275	336.40	M	(0.03273	0.18180	0.78550	0.00000)
6) hucorder<57.5	77	141.90	M	(0.09091	0.37660	0.53250	0.00000)
12) mtemp<8.8675	63	86.05	M	(0.00000	0.42860	0.57140	0.00000)*
13) mtemp>8.8675	14	27.78	A	(0.50000	0.14290	0.35710	0.00000)*
7) hucorder>57.5	198	155.80	M	(0.01010	0.10610	0.88380	0.00000)
14) dampass<2.5	16	19.87	D	(0.00000	0.68750	0.31250	0.00000)*
15) dampass>2.5	182	99.26	M	(0.01099	0.05495	0.93410	0.00000)*

* denotes terminal node

Notes

List of Acronyms

ASQ	Allowable Sale Quantity
AUM	Animal Unit Month
BEA	Bureau of Economic Analysis
BLM	Bureau of Land Management
BMPs	Best Management Practices
BTUs	British Thermal Units
CFR	Code of Federal Regulations
CRBSUM	Columbia River Basin SUccession Model
EIS	Environmental Impact Statement
EEIS	Eastside EIS Planning/Management Area
EPA	Environmental Protection Agency
ERU	Ecological Reporting Units
ESI	Existing Scenic Integrity
FACA	Federal Advisory Committee Act
FEMAT	Forest Ecosystem Management Assessment Team
FIRE	BEA designation; Finance, Insurance and Real Estate industries
FS	Forest Service
FSH	Forest Service Handbook
GIS	Geographic Information System
GPM	General Planning Model
GSP	Gross State Product
HUCs	Hydrologic Unit Codes
LWD	Large Woody Debris
ICBEMP	Interior Columbia Basin Ecosystem Management Project
ICRB	Interior Columbia River Basin
INFISH	Inland Native Fish Strategy
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NWFP	Northwest Forest Plan
PACFISH	Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and portions of California
PILT	Payments in Lieu of Taxes
RAC	Resource Advisory Committee
RHCA	Riparian Habitat Conservation Area
RMA	Riparian Management Area
ROS	Recreation Opportunity Spectrum
PVG	Potential Vegetation Group
PVT	Potential Vegetation Type
RVD	Recreation Visitor Day
SER	Species-Environment Relations (database)
SIC	Standard Industrial Code
SIT	Science Integration Team
TES	Threatened and Endangered Species
UCRB	Upper Columbia River Basin EIS Planning/Management Area
USDA	United States Department of Agriculture
USDI	United States Department of Interior
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

Metric Conversion

Mile (mi)=1.61 Kilometers (km)

Kilometer (km)=.62 Miles (mi)

Square Kilometers (km^2)=.39 Square Miles (mi^2)

Centimeter (cm)=.3937 Inches (in)

Meter (m)=3.28 Feet (ft)

Hectare (ha)=10,000 Square Meters (m^2)

Hectare (ha)=2.47 Acres (ac)

Acre (ac)=43,560 Square Feet (ft^2)

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The Evaluation of EIS Alternatives by the Science Integration Team describes the outcomes, interactions, effects, and consequences likely to result from implementing seven different management strategies on Forest Service (FS) and Bureau of Land Management (BLM) administered lands within the Interior Columbia Basin and portions of the Klamath and Great Basins. Two environmental impact statement teams developed seven alternative approaches to the management of forest, rangeland, aquatic, and watershed systems of FS- and BLM- administered lands. The alternatives varied from continuation of current management, to managing biodiversity within a network of large reserves, to actively managing to restore ecosystem health and integrity. Continuing with current management direction, in the absence of interim protection measures, results in continued declining trends in ecological integrity and increasing risk to species. No single alternative was found to result in improved outcomes for all species, reduced risk to ecological integrity, and improved resiliency for social and economic systems. Alternatives that prioritize activities to restore and/or maintain ecological integrity and simultaneously provide desired goods and services within the capability of the ecosystem appear to have favorable trends in most species outcomes, landscape functions, and resiliency in social and economic systems. The Draft and Final Environmental Impact Statements are expected to differ to some extent from the preliminary Draft Environmental Impact Statement analyzed for this evaluation.